

July 1937

TECHNOLOGY REVIEW

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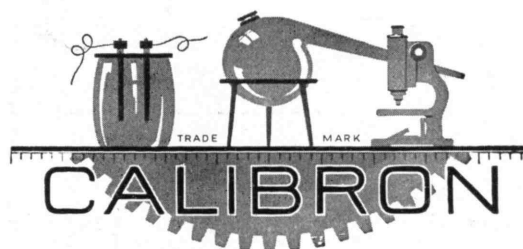
THE TECHNOLOGY REVIEW, July, 1937. Vol. XXXIX, No. 9. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription \$3.50; Canadian and Foreign subscription \$4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

THE TABULAR VIEW

BY PRECEPT and example, by his distinguished achievement in the engineering art, and by public-spirited activity in engineering organizations, GANO DUNN has contributed notably to the professional advancement of the engineer in America. His words, therefore, are the words of wisdom, and The Review is happy to present the article on page 406 drawn from his address at the M.I.T. graduation exercises last month. It is hardly necessary to add that, since 1913, Mr. Dunn has been president of the J. G. White Engineering Corporation.

OF THE three fundamental needs of mankind — food, clothing, and shelter — shelter is certainly the one which is today receiving concentrated attention. The dire predictions of Malthus in regard to the pressure of population upon the food supply have been definitely set aside by technical advances, and our problem of food has become not one of producing sufficient to feed the growing population but rather one of preserving a reasonable balance of return to the food producer. Similarly, the problem of clothing, once the major item in the budget of the underprivileged, has become merely one of a large number of items. Abundant and cheap clothing is with us. The population indeed uses it in strange and devious ways, but the accent has now turned from necessity to luxury for almost the entire population. The single great problem of shelter remains. Somehow this has resisted the general trends, and advancing technology and social organization have not produced the adequacy and abundance in this field which they have accomplished with other fundamental needs. It is highly proper, therefore, that this conference on Alumni Day in this institution should be devoted to this problem of shelter." We quote from the remarks of Dean VANNEVAR BUSH, '16, in opening the Housing Conference at the Institute on June 7, the proceedings of which are published in this issue beginning on page 407. In commenting on this Conference the editor of an architectural magazine has written: "May I add a word of congratulation to the many you must be receiving as a result of the Housing Conference . . . ? Considering the many rather disjointed housing conferences I have attended during the past five or six years, this one stands out as a high spot." The authors of the five papers are identified at the points where their addresses begin. Reprints of the entire proceedings may be obtained without charge by applying to the Editors of The Review.

The Technology Review is not published during the summer months following July. This issue, therefore, concludes Volume 39. Number 1 of Volume 40 will be published on October 27, and dated November. Readers who bind their copies are reminded that if they possess nine numbers of Volume 39, their files are complete. An index to the volume will be ready on August 15 and will be supplied post-free upon request.



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PICTURES AND LETTERS FROM REVIEW READERS

Popular Error?

FROM ALFRED L. FITCH, '84:

An expression, about the middle of the second column on page 325 of the June issue, is the reason for this letter. You say, in effect, that sixty million is ten times faster than six million. I have always understood that one thing exceeds another in size, speed, or what not, by the difference between them, and if that is correct, in this case 60 exceeds six by 54, or nine times instead of ten times. I know that this is a common method of speaking, but consider it one of those popular errors that are out of place in a scientific magazine like *The Technology Review*. I notice that some writers have the same idea as I have and in a case like this would say 10 times as great. If you have any argument against mine and think I am wrong, I am from Missouri.

North Easton, Mass.

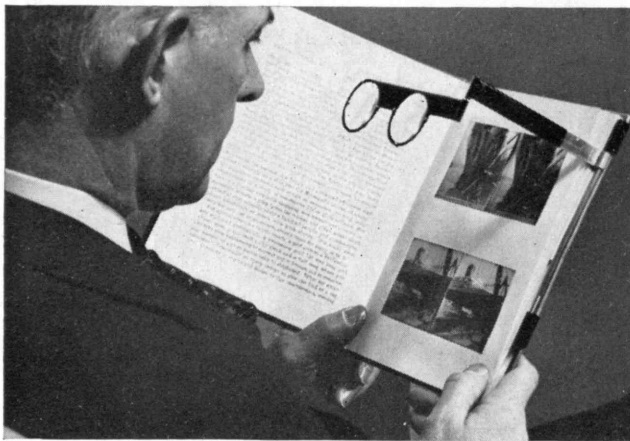
Are there other Review readers who find the phrase, "sixty million is ten times faster than six million," illogical, inaccurate?

Stereo Books

THE two following letters, one from the inventor of the new book stereoscope and the other from a publisher, come as footnotes to our March article, "Seeing Solid."

FROM VAN DYKE HILL:

I am somewhat ashamed to admit that the March issue of *The Technology Review* came to my attention only a few



days ago. It just goes to show that one should never miss an issue of a publication so rich in content as your own. Your article, "Seeing Solid," is the first really comprehensive thing I have ever read in an American publication on the subject of stereoscopy. I quite agree with you that the bibliography of the subject is barren indeed. Because of the thoroughness of your article and the evident interest you manifested, I am submitting the following which I hope you may find of some added interest. . . .

In making a few preliminary studies, I became deeply interested in the subject. . . . The final concept, which I reached after considerable study, was third-dimension pictures in book

form, and by this I mean stereograms printed in books of ordinary binding, in loose-leaf books and in any other book form, each book equipped with a simple and an inexpensive viewing device which would not radically change the age-old method of handling and reading a book but would be an integral part of the book.

After a thorough search of the Patent Office, I found, to my delight, that no patent had ever been issued that even remotely approached my invention. I knew, however, that one or two books had been published . . . and a separate viewer, to be held in one hand, entirely separate from the book, had been supplied with them. Obviously, such an idea was impractical because of the inability of the readers to hold the device and repeatedly focus, with accurately parallel position, the viewer.

The [adjacent] photograph visualizes my solution of the problem. The device as illustrated assures an accurate optical relation between the viewing lenses and the illustrations and provides for simple focusing while, at the same time, leaving both hands free to hold the book and turn the leaves in the usual manner. In addition to the foregoing, the invention, because of its book form, provides the fullest opportunity for the pictures to be accompanied by comprehensive text and any supplementary drawings or illustrations desired. . . .

Five of America's largest companies — one in the automotive field, one manufacturing electrical products, and a manufacturer of motorboats and cruisers — have already authorized the American Stereograph Corporation to make from 10 to 120 stereo photographs of their products, the photographs to be inserted in loose-leaf books, beautifully bound, and containing appropriate supplementary matter, such as technical drawings, dimensional figures, specifications, and so forth, for the use of their salesmen who heretofore have relied upon ordinary two-dimension photographs in visualizing their products.

I feel thoroughly convinced, and hope with due modesty, that my invention will open an entirely new field of thought, application, and opportunity with respect to three-dimension illustrations, not only in the world of general books, educational textbooks, and as a new weapon for salesmen, but also in such institutions as medical, technical, and art institutions, as material for reference libraries wherein series of loose-leaf books will be compiled for record and for the guidance of students. One of my immediate problems is to ascertain the names and addresses of everyone, and especially scientific men, who are interested in stereoscopic photography, for we are now able to supply photograph albums into which are bound my viewing device.

I wish to assure you of my appreciation of the splendid article referred to and of the excellent research you must have conducted to gather the material for this article.

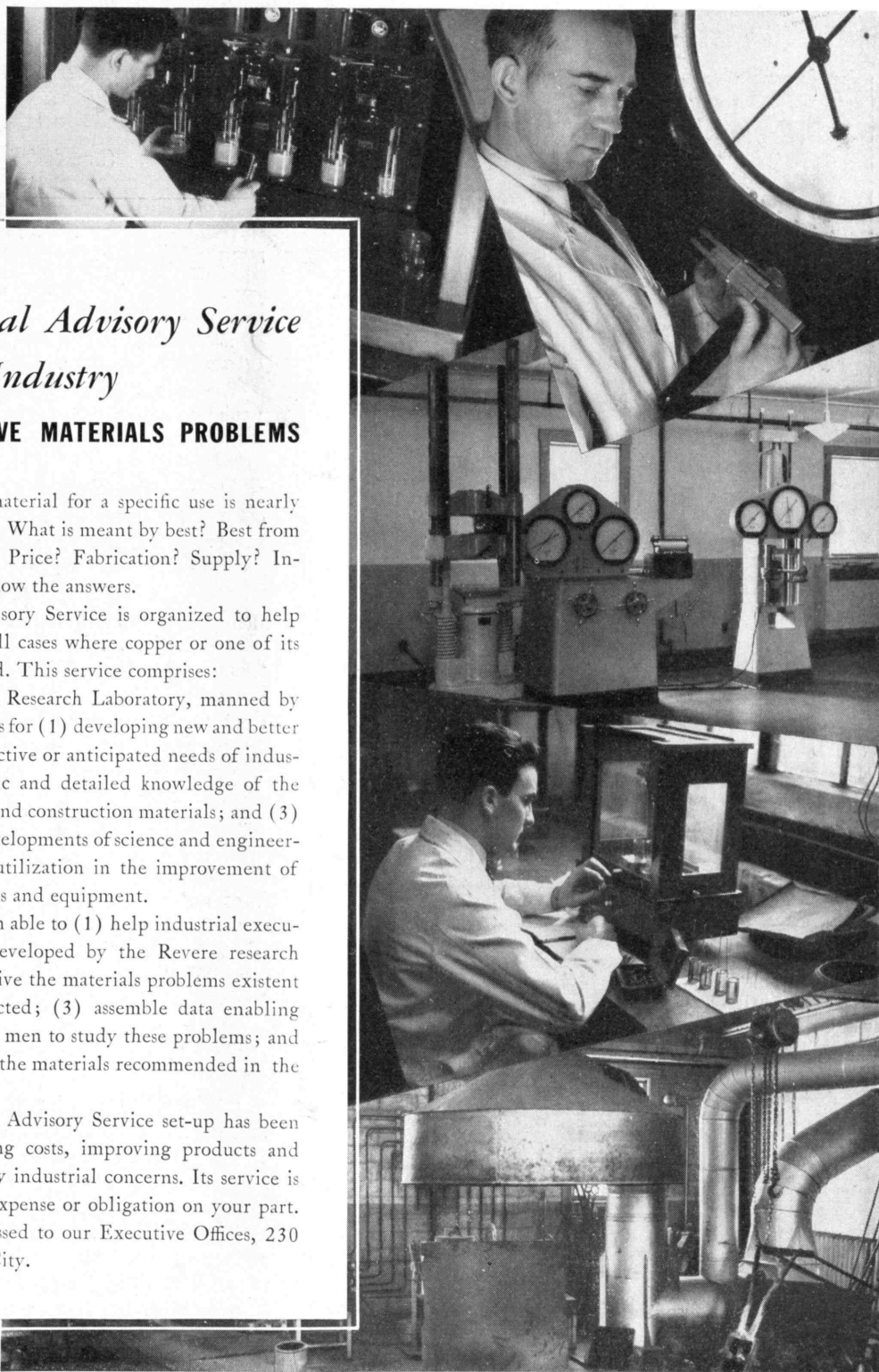
New York, N. Y.

FROM FARRAR AND RINEHART, INC.:

We were very much interested in the article appearing in the March issue of *The Technology Review*, "Seeing Solid." . . . We are bringing out a series of stereoscopically illustrated books, each fitted with a folding stereoscope attached to the back cover. . . . Thank you very much for an informative and delightfully written article.

New York, N. Y.

(Concluded on page 392)



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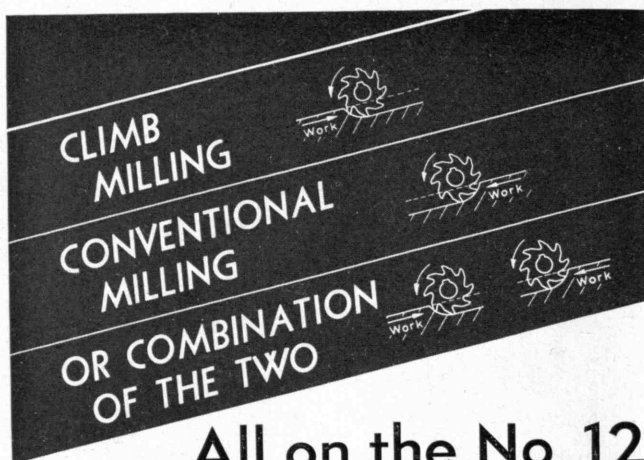
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(Concluded from page 390)

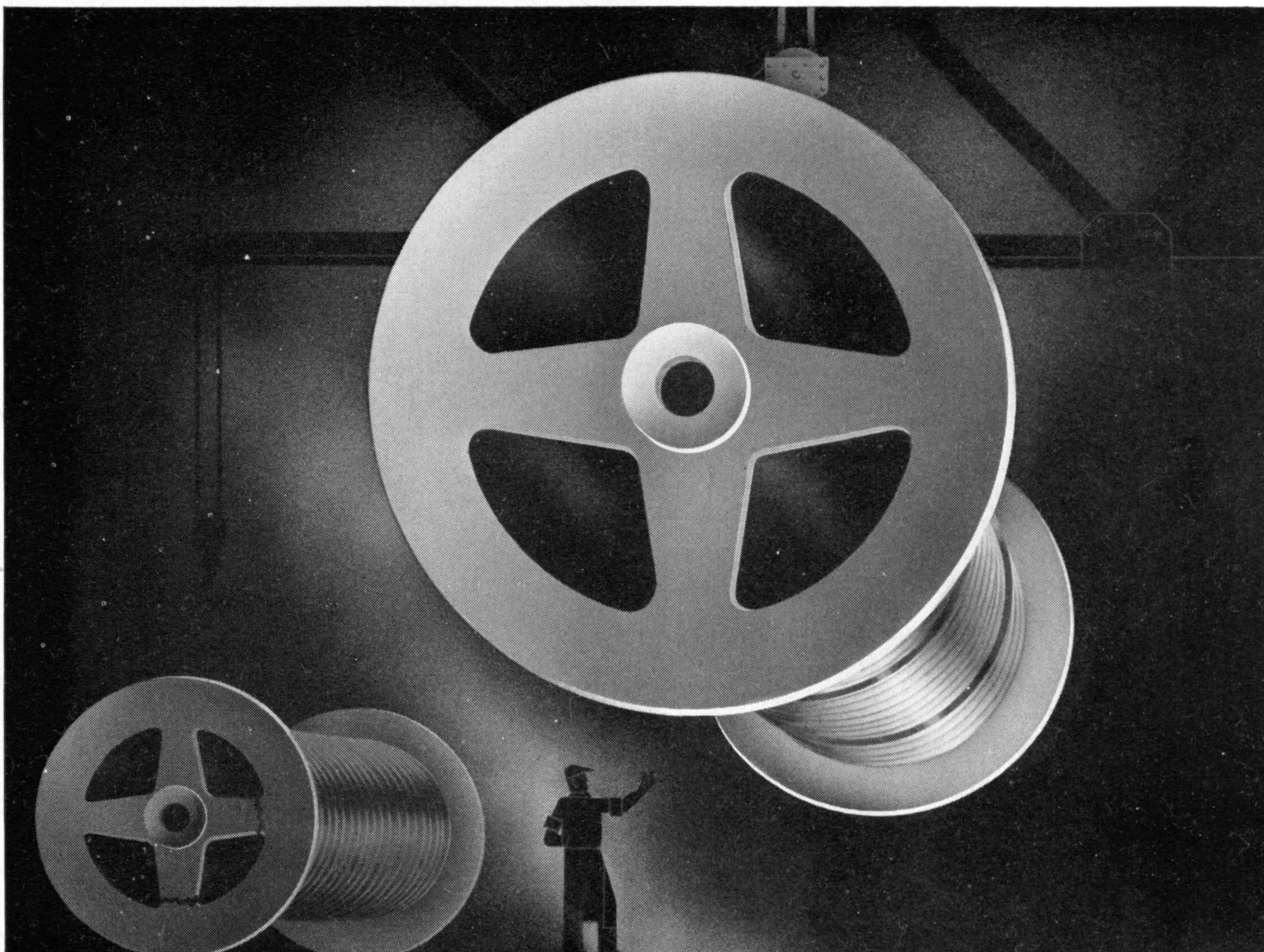
Digested Comments

THE digest method is becoming so popular in journalism that The Review (may it be forgiven!) has finally yielded to the current temptation and offers the following "letters digest," culled from scores of letters from readers.

We are particularly interested in learning of the wide variety of ways which The Review's interpretative articles are used. The head of the science department of Bassick High School, Bridgeport, Conn., writes: "I can assure you that The Reviews have been left around the classroom and have been widely seen by my physics pupils, and it may interest you also to know that they register favorably with the head of the art department who has been in to borrow several of the issues to be used to illustrate what I believe she calls 'technology in the abstract.'" . . . From the chairman of the mathematics department of Washington Irving High School, New York City, we received this message: "Please accept our expression of appreciation and admiration of your very fine periodical. . . . The faculty, as well as the students, have been very happy and interested in the study of the articles, which in some instances were very important for their work."

Other readers have different reasons for appreciating The Review: "I like The Review — used excerpts at Woman's Club meeting." . . . "The Review is much in demand in this office, particularly by the amateur photographers." . . . "I take this opportunity to congratulate The Review on the splendid job it is doing to keep the Alumni abreast of the times." . . . "Incidentally, we derive a great deal of pleasure from reading The Review, and it is extremely helpful in our work."

It's impolite to point, particularly with pride, but our readers insist upon doing it. Thus: "It is without doubt the finest publication of its kind." . . . "Your magazine has proved very interesting to me as an engineer and as an Alumnus, and I look forward with pleasure to each issue." . . . "As always, the arrival of The Review causes me to lay aside other matters and glance through the publication, and as usual I get some reaction or stimulus from some article." . . . "Though it would seem unnecessary to strive for — and almost impossible to achieve — any further improvement, a comparison of successive volumes shows steady accomplishment of higher and higher standards of excellence." . . . "Although I dare say I don't understand all of what I read, I found it most absorbing and I read it from cover to cover. I only wish that the technical publications of my profession would be as interesting to outside persons as is The Technology Review." . . . "I always wonder each year how you and your associates are going to exceed your previous efforts, but you always manage to do so in a very superior way." . . . "Congratulations, incidentally, on The Review; I think you are doing a grand job."



Cutting down reject percentages in difficult castings

● THE difficulties ordinarily encountered in bringing large castings of varying sections safely out of the mold have been strikingly demonstrated in one foundryman's experience with hoisting drums. With the usual carbon cast steel, the spokes had a tendency to pull away from the drum on cooling. Cracks and breaks brought the rejects to a discouraging percentage.

● By the simple addition of Molybdenum, the solution was found. The better casting qualities of Moly cast steels are explained in this now widely recognized technical fact: The expansion of steel, cooling through the transformation point, is virtually eliminated by the addition of Molybdenum. The effect reduces the likelihood of cracked castings, especially in those having radical differences in section.

Our technical book, "Molybdenum," contains practical data on Moly irons and steels. It will be sent on request — as will also our monthly news-sheet, "The Moly Matrix." Be free to consult our laboratory on special ferrous problems. . . . Climax Molybdenum Company, 500 Fifth Avenue, New York City.

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MOLY

HOW THE TAMED the belt-breaking fuller mill drives

TROUBLE WAS THE FIRST, last and middle name of these two fuller mill drives in a large eastern chemical works.

FASTENERS PULLED OUT on an average of once a month under the shock loads and stretch had to be cut out at frequent intervals. Constant fraying by riding up against the motor frame was another difficulty, while a severe abrasive dust condition made large and regular applications of dressing necessary to keep the drives functioning.

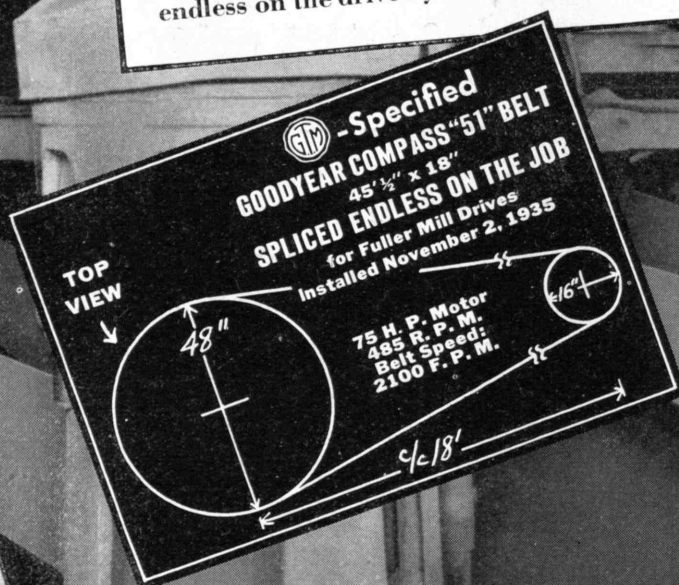
ONE YEAR'S SERVICE was the maximum being obtained from the highest quality ply belts, six months the average and that only with considerable nursing, when the plant superintendent told his troubles to the G.T.M.—Goodyear Technical Man.

ON THE G.T.M.'S RECOMMENDATION a Goodyear COMPASS "51" Belt was applied on No. 1 mill on November 2, 1935 and on No. 2 mill on February 16, 1936. To end the fastener difficulty both belts were made endless on the drive by Goodyear's patented

vulcanized splice. To overcome the dust both belts were made with an inner ply of Goodyear's new 5-R friction surface whose permanent high adhesion makes it possible to operate heaviest drives at 25% to 50% lower tension.

TODAY, 20 AND 17 MONTHS LATER, respectively, both belts are performing faultlessly and have never required a single repair. COMPASS' balanced true-running construction has eliminated riding up on the pulleys. In all this time no dressing has been necessary except one application of a special Goodyear-prepared compound to the surface of No. 1 belt after its first year's service. The plant estimates that the saving in dressing cost alone has paid for the belts—while the saving in repairs is all gravy.

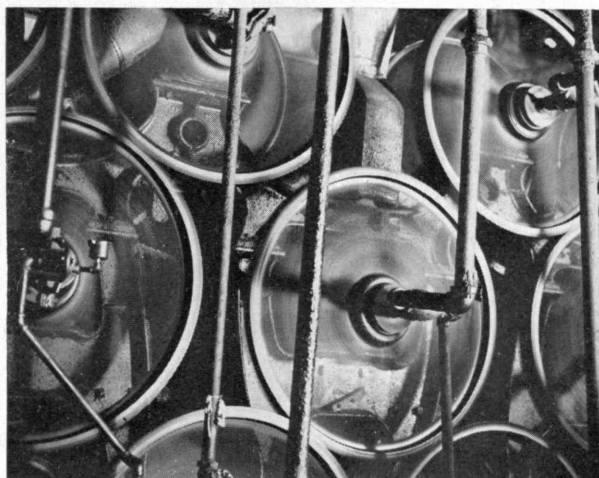
THIS IS THE KIND of money-saving belt performance the G.T.M. stands ready to furnish on your hardest drives. To bring him to your office, write Goodyear, Akron, Ohio, or Los Angeles, California—or the nearest Goodyear Mechanical Rubber Goods Distributor.



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 Goodyear Tires

THERE'S A
GOOD YEAR
 BATTERY
 NOW!

THE GREATEST NAME  IN RUBBER
GOOD YEAR



The skillful photographer found this interesting composition on the side of a paper-making machine

Young and Phelps

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VOL. 39, NO. 9

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OLD WASHINGTON BRIDGE, HARLEM RIVER

Photographed by Dmitri Kessel (Black Star)

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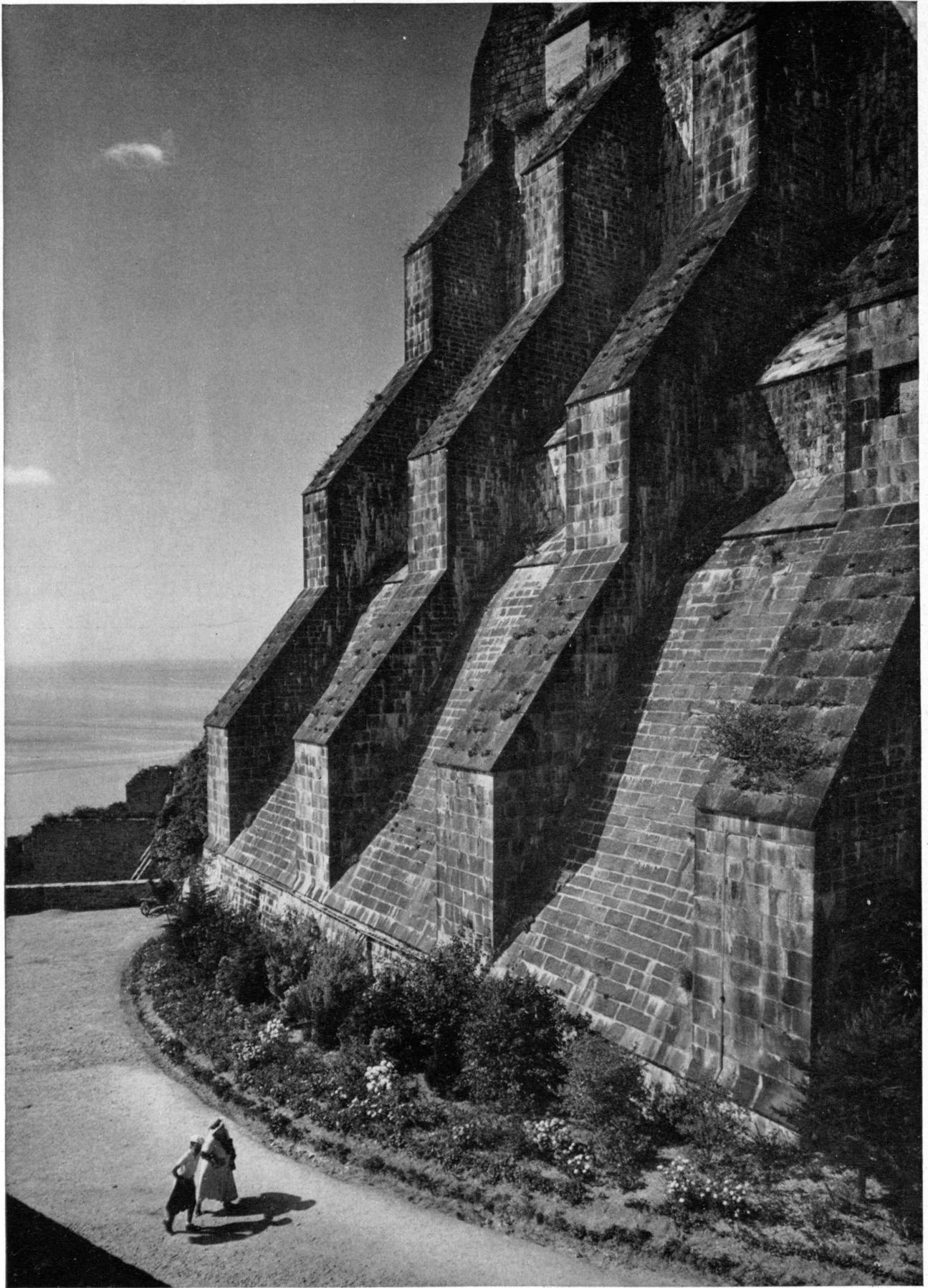
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From a copyright photograph of Mont St. Michel by F. S. Lincoln, '22

SOARING STRENGTH

(396)

THE TECHNOLOGY REVIEW

Vol. 39, No. 9



July, 1937

The Trend of Affairs

Omnium Gatherum

IN its capacity as journalistic centrifuge, The Review has compacted the following sedimentations from the suspension of recent scientific and engineering news. From biggest to smallest, from serums for humans to poisons for bugs, the vehicle of human intelligence has been, as usual, carrying of late a varied content.

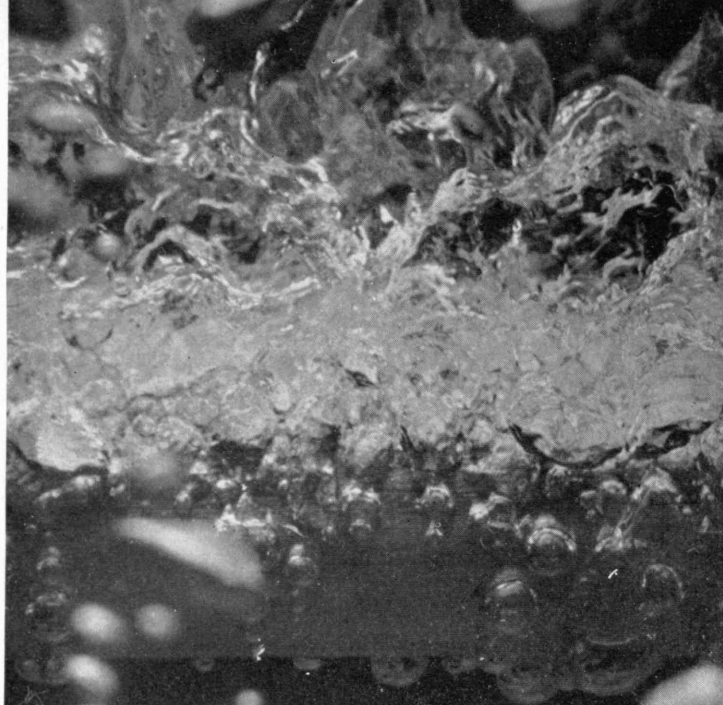
Extremes of size and number are presented by: a compact battery, weighing less than two pounds but capable of delivering 1,000 volts; a truck-trailer combination possessing 28 wheels and hauling a load of 30 tons; McGonigle No. 12, deepest producing oil well in the world, penetrating the earth 10,569 feet; and a new television projector which enlarges a tiny picture 2,600 times (see The Review for June, page 325). ¶ The battery, completely dried and sealed in an airtight box, is activated by a few drops of ammonium chloride and is dried out again after use, so that it will keep indefinitely. It was devised to supply high voltage without great weight in small, unmanned balloons used in cosmic-ray measurement. ¶ Limits imposed on the allowable load per tire led to the multiplication of wheels on the truck, which was designed to transport a steam shovel. ¶ Another distinction of the deepest well, in the Ventura field, is that its bottom is less than a degree off vertical. ¶ The new television projector, utilizing a stream of electrons, stepped up small photographs to images eight by ten feet in a demonstration in New York.

Rabbits excel horses as sources of pneumonia serum because the antibody molecules developed in the rabbit's body to combat the pneumonia germs are smaller than equine antibodies and consequently will spread faster through infected human tissues. Serum thus made is more effective and is cheaper to produce than the horse serum. ¶ Also on the medical front is the announcement

of successful use of sulphanamide and its relative, prontosil, in the treatment of common refractory streptococcus infections such as childbed fever. Amazingly successful and speedy, often operating in as few as three days, the drug appears to be the first real advance in the use of chemicals to fight infections since the discovery of the chemical treatment for syphilis. Prontosil, doctors have reported, has produced similarly spectacular results in the treatment of gonorrhea and pyelitis. ¶ Isolation and synthetic manufacture of a new male sex hormone, yclept epiallopregnanolone no less, have been accomplished. Minute amounts of this hormone aid the development of male sex characteristics.

The vegetable world impinges on the animal in the use of papaya juices to tenderize meats. The papaya, a melon-bearing tree of phenomenally swift growth, is being introduced into Florida. A papaya seed planted in March becomes a tree taller than a man in ten months, and bears. ¶ From the dried flower heads of pyrethrum, a plant always poisonous to insects, is extracted pyrethrin, the deadly component of insect-killing sprays. Importation of over thirteen million pounds of dried pyrethrum annually from Japan and Yugoslavia is leading to efforts to establish a pyrethrum crop in the United States. ¶ Licorice-root fiber, left over after the extraction of the juices, has been converted by Italian scientists into a high-grade cellulose, from which nitrocellulose for lacquers and for explosives has been produced. ¶ A wild plant, native to Japan, is the source of a new worm expellant, alantolactone, said to be four times as effective as santonin. The new product is made available in a crystalline form.

Flexible metal tubing, possessing the useful characteristics of metal and the pliability of rubber, is being made from conventional seamless tubing corrugated bellows-fashion, adjacent corrugations parallel to each



Photographs (exposure: 1/100,000th second) by W. B. Tucker

HOW HOT IS HOT ENOUGH?

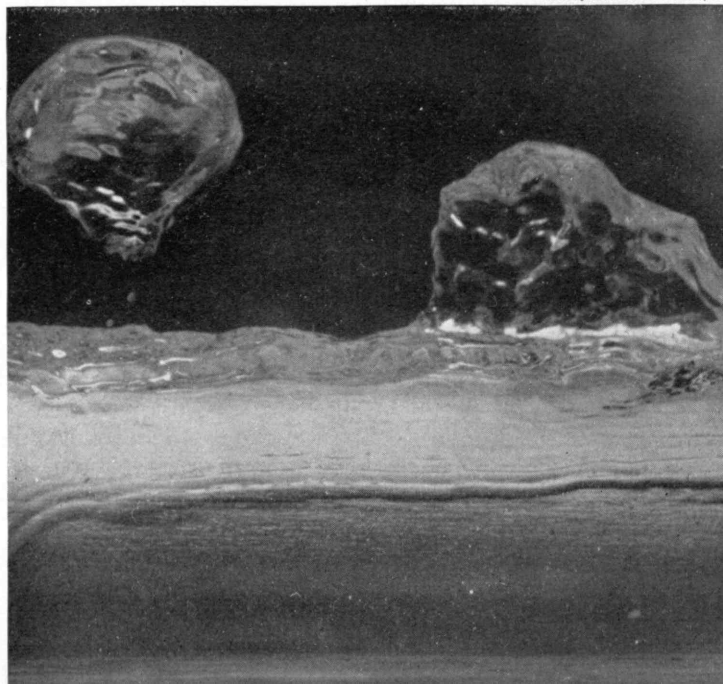
The surprising answer is confirmed by these high-speed photographs of ethyl acetate boiling at atmospheric pressure. When a drop of water falls on a red-hot stove and skims merrily over the surface, instead of bursting immediately into vapor, it is dancing on an insulating film of steam. If the stove were cooler, the insulation would be less, the vaporization, quicker.

Researchers in the Institute's Department of Chemical Engineering have shown that the same principle applies to the heating of liquids by hot pipes immersed in them; if the pipes are too hot, the heating of the liquid will be less efficient because vapor films form around the pipes, which retard the heat transfer.

In the top picture the steam-heated aluminum tube is 73 degrees F. hotter than the surrounding ethyl acetate, and the heat transfer rate is 41,000 B.T.U. per hour per square foot. In the lower picture the temperature difference is much greater — 104 degrees F. — but the heat transfer rate is much lower — 5,800 B.T.U. The reason is visually apparent: The hotter tube below is coated with an insulating film of vapor. The researchers at Technology, working under the direction of Professor W. H. McAdams, '17, have found that the temperature difference at which maximum rate of boiling occurs is small for many liquids.

An understanding of such principles of heat exchange is important to many industries that employ boiling of liquids — in the separation, for example, of petroleum products by fractional distillation, in the concentration of acids by evaporation, or even in the quenching or tempering of metals by plunging them at red heat into a bath of water or oil.

Data from E. T. Sauer, '37



THE TECHNOLOGY REVIEW

other and rounded at top and bottom. The tubing thus far ranges in inside diameter from one-eighth of an inch in monel metal to 40 inches in steel. Some of the smaller sizes have been tested with pressures up to 3,000 pounds. ¶ The thinnest rolled metal-alloy section, six-millionths of an inch in thickness, was produced at Schenectady by placing welded strips of two alloys between pieces of steel and rolling the entire assembly. Not yet manufactured for general sale, the product, it is estimated, would cost several million dollars a pound.

Thin metal films of another kind are those resulting from the application of metallic paints, in which tiny flakes of metal interleave to form a protective coat when the paint is spread out on a surface. Lead, which hitherto has been used in oxide forms as a pigmentary component of paints, is now being employed in the metallic form, thin lead foil being broken up to fine flakes carried in vehicles such as the new synthetic resins, tung oil, and mixtures containing phenolics. Waterproofing, or sealing concrete is one use foreseen for the new lead paint, which is expected also to compete on a cost basis with red lead, wherever the latter is used. ¶ Activated carbon paints suitable for undercoats, developed in Germany; a noncoloring enamel made from urea resin in Japan; and an enamel containing rubber, produced in England, are other newcomers in this field. Paints utilizing an acid dispersion of casein in which the pigments are suspended continue to gain in popularity. The rising price of casein is a determinant in their competitive position. Experiments with the substitution of gamma protein of soybeans for casein have been made.

In Leaf and Blood and Oil

PROBABLY the most important class of naturally occurring pigments or coloring matters is that group of organic chemical compounds known as the porphyrins. Literally, the word means a purple color, though many of the porphyrins yield bright red solutions in ether solution.

These compounds have a great biochemical, and, as we shall see later, geochemical interest, arising from the fact that they form an essential part of the constitution of the molecules both of chlorophyll, the green coloring matter of plants, and of the hemoglobin of the red corpuscles of the blood. Chlorophyll, in its turn, is an indispensable link between the inanimate world and all living things. Without it, the green plants cannot thrive and carry on the photochemical processes necessary for building up their cellulose and their starch. If the plants were to cease their existence, then in the long run the animal kingdom would starve, and, finally, the dinner table of the human race would be bare and mankind itself would disappear. Hemoglobin is the oxygen carrier of the blood, bringing oxygen from the

lungs of land animals or the gills of aquatic species to the remote tissues of the body. When the supply of hemoglobin in the blood diminishes, we suffer from anemia and may even perish.

The unique positions in the life cycle held by chlorophyll and hemoglobin led organic chemists many years ago to begin an investigation of these compounds. As early as 1879, crystalline porphyrins were obtained from both leaf and blood pigments. At first they were thought to be identical chemically. Later work showed that they were different but closely related compounds. To Hans Fischer, Nobel Laureate for 1931, goes the honor for showing definitely the structure of porphyrin in the hemin of the blood and for synthesizing hemin itself. In the years since the work on hemin, Fischer has added to his accomplishments the demonstration of close chemical relationship between chlorophyll and hemoglobin.



In 1935, Treibs, a German chemist, discovered considerable amounts of the porphyrins, characteristic of green plants, and smaller amounts of mesoporphyrin, characteristic of hemin, in many shales, asphalts, and asphaltic petroleum. In his work, he isolated porphyrins from an oil shale obtained in the Karwendel Mountains, from Galician and Trinidad petroleum, and from Trinidad asphalts. Many coals, likewise, were found to contain porphyrins. Tests and experiments on these compounds leave little doubt that chlorophyll and hemin are their parent substances.

These discoveries of Treibs (confirmed by other investigators) point clearly to a relatively low-temperature origin and continuous low-temperature history of the deposits of petroleum and of oil-bearing shales. The larger amounts of porphyrins characteristic of chlorophyll give to plants a major part in the formation of petroleum and a less important role to animals.

One may go a step further and see, in the porphyrins present in petroleum and coal, support for the impelling desire to endow the earth in past geological epochs both with forests having their myriads of leaves green as they are today and with prehistoric animals and ancestral tribes and races having their veins distended

by virtually the same kind of red blood now pulsing through the inhabitants of this latest age. In other words, the porphyrins have not only great biological and chemical but also a geochemical significance.

Recently a new group of pigments, closely related in structure and in their absorption spectra to the porphyrins, have been discovered by accident in the laboratory. When, for example, the organic compound, phthalonitrile, is fused with copper salts, a very beautiful stable blue pigment is produced. This pigment and

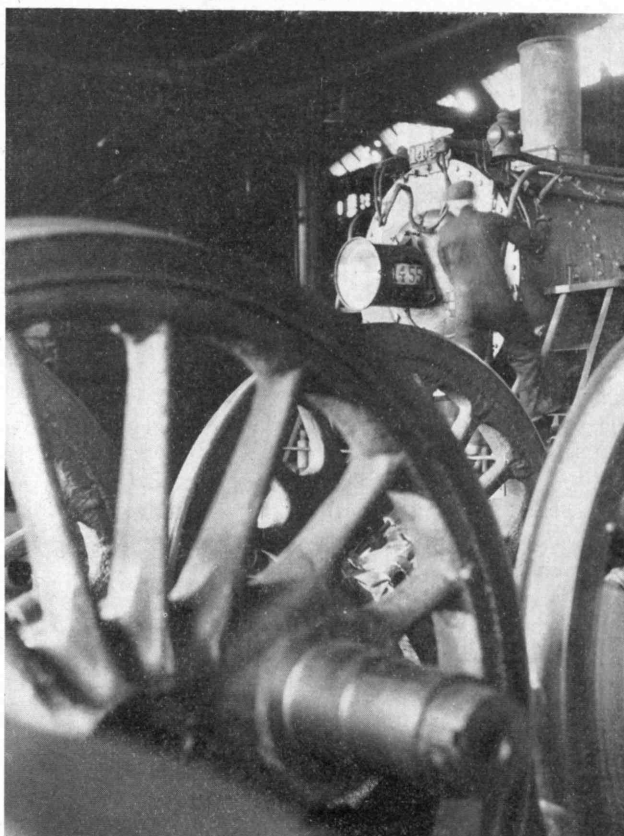


Photo-Media—Bartlett

FOR LOCOMOTIVE FANS

... and they are still legion despite the electric and the Diesel, these two pictures of activities in and about the roundhouse

others related to it have moved the dye manufacturers to intensive researches in what promises to be a very valuable new field for stable colors.

Essence of Pearl

CONFECTING pearl essence from fish scales, sometimes thought of as a development of modern industry, began nearly 300 years ago when Jacquin, an observant French rosary maker, began coating beads with the substance in an attempt to imitate pearls. His enterprise and gradual improvement of the process of extraction laid the foundation for a unique industry, the product of which is now used not only as a coating for pearls but as a pigment for automobile lacquers and for various decorative purposes.

Jacquin's crude method of capturing the pearl-like luster of fish, particularly the bleak, a fresh-water European fish, consisted of mixing the scales with



Clair E. Turner, '17

BALI LANDSCAPES

In Bali the rice growers convert the hillsides into such ingenious and ornamental parterres as these



water, agitating the mixture, and finally decanting most of the water to leave the lustrous essence. His first beads were made of wax or alabaster and were neither waterproof nor very durable. As his technique improved, he developed opaque glass beads and finally anticipated the comparatively modern method of using the tiny hollow glass bead, the inside surface of which was coated with pearl essence.

For more than two centuries, fish-scale pearl essence was used almost exclusively for beads. Factories sprang up in France, and a method of reducing the scales to the form of essence by adding ammonia to the solution, as a preservative and solvent for organic matter surrounding the pearl crystal, was one of the important early advances in its preparation. Meantime the art of making beads progressed, and wax was used to fill the hollow beads for added strength and weight. The best modern example of the art is the so-called indestructible pearl, the opal-like solid glass bead which is now coated on the outside with pearl essence which is either protected by a lacquer overcoating or incorporated as the pigment of a special lacquer.

Jacquín's successors long sought to determine the composition of the substance which gives fish scales their inimitable luster. One early chemist "proved" it to be silver. Others came to the conclusion it was various earthy carbonates or phosphates. Finally, in 1895, the substance was identified as a pure guanine in the form of bladelike crystals in the epidermis of the fish.

Development of the pearl-essence industry on a large scale in this country began during the World War, which virtually stopped the production of the essence in

Europe. Harden F. Taylor, an authority on the production of pearl essence, has found that many species of American fish are suitable for its production. Herring, alewives, shad, and many others are now being used, and the potential supply of fish scales, long a waste product, is virtually inexhaustible. Mr. Taylor's research indicates that menhaden, silver carp, gizzard shad, and the California sardine are potential sources of pearl essence.

Although ammonia is still used to dissolve the proteinaceous matter of the fish scale and to preserve the essence, various other

chemicals, including salicylic acid, acetone, or amyl acetate, have come into use. Color and fineness of grain dictate the grading of the essence. First-quality essence has a brilliant luster and when agitated, according to Mr. Taylor, should give beautiful, iridescent "whirling" effects. The color may be silvery white, and certain essences of high quality have a slightly pinkish tinge. Essences of grayish or brownish tones are of inferior grade. Scales from small fish, such as herring and alewives, make a fine-grained essence which is, for example, of much higher quality than that from shad or similar large fish.

Extraction of pearl essence is now a carefully controlled chemical process. As soon as the fish scales are received, the fatty matter surrounding the guanine crystal in the scale is carefully removed by agitation and warming in chemical solutions. The water and soluble matter are then separated in a centrifuge in a succession of operations which finally leaves the guanine crystal free of fat. This process is followed by an alkaline bath, and the crystals are then washed repeatedly

to remove any traces of the chemicals used in the previous processes. The resulting concentrate is ready in this form for incorporation as a pigment in the various types of lacquers or other vehicles best suited for the purpose of application.

Pearl essence is now being widely used in automobile lacquers, imparting depth of color and iridescent beauty. It is also used in lacquers for various other purposes, including innumerable novelties.

Methods of making imitation pearl beads, which are produced in great quantities by several companies, involve a surprising amount of handwork. In the hollow wax-filled type, the essence is mixed with one of several vehicles and injected by means of a delicate pipette while the bead is revolved on a tiny spindle. Sometimes the essence contains a dye to produce the much desired flesh tint. The coating on the inside of the bead is quickly set by touching the outside with a brush moistened with ether, the rapid evaporation of which chills the solution. After drying, the beads are filled with wax. The finest beads are blown individually, while cheaper grades are formed in molds from thin tubes and then cut apart.

The so-called indestructible solid beads are made of a milky or opal-like glass and are coated by various methods with the pearl essence, which often contains gelatin or fish glue. The coating may be applied by dipping or air brushing and when dry is protected with a film of nitrocellulose or pyroxylin lacquer. Several coats of the essence and lacquer may be applied alternately and the beads are then carefully polished with jewelers' chalk applied on chamois skin.

Herring scales are used almost exclusively for production of pearl essence on the Atlantic seaboard, and most of the plants making the substance are located at fishing ports on the New England Coast from Cape Cod to Eastport, Maine.

Heavy Stones for Lightness

THE Swedes found the proper word when they named that hard, white metal *tung*(heavy) *sten*(stone). It is an element whose physical properties are featured by extremes. Although its specific gravity of 18.8 makes

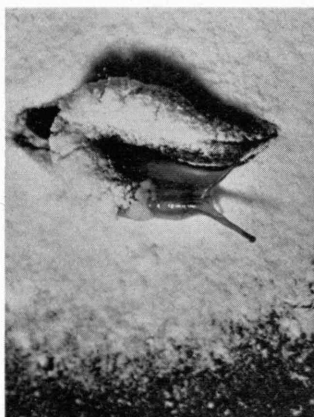
it one of the most dense of commercially available materials, it has been unavailable for many medical and industrial applications where its density would be valuable, because it melts only at a temperature which would give pause to Satan himself — 3,400 degrees C. At such heat levels the fabrication of large sections is almost impossible, and, in addition to this difficulty, the metal is so hard that it cannot be machined by any practical methods.

General Electric engineers at Wembley, England, have not overcome but have instead neatly evaded these difficulties, producing an alloy which is almost 50% heavier than lead, has a tensile strength of 44,000 pounds per square inch, and, although 90% tungsten, is easily machined. Bombarded by a ceaseless stream of articles extolling the achievements of engineers in cutting down weight and in creating lighter materials, the public may wonder why anyone should waste good time and money in finding a substance whose main virtue is its heaviness.

One immediate application is in the construction of radium bombs for hospitals. Since the ability of a metal to absorb the dangerous gamma rays is directly proportional to its density, the bombs have been made of from 50 pounds to 100 pounds of lead. Reducing the bulk of these bombs would greatly increase their efficiency, but the only obtainable metal which could allow that reduction is gold. With a specific gravity only three points less than that of gold (16.3 and 19.3, respectively), the new alloy is an excellent substitute.

With what appears on the surface to be a calm disregard of reason, the alloy is also being used in automobile racing engines and may soon be included in airplane engines, because it furnishes mass in concentrated form and so permits compactness with no sacrifice of balance. Another use for the dense alloy may be in the construction of gyroscopes, where its relatively high tensile strength is an advantage. The largest field, however, appears to be its use as a contact material in heavy-current circuit breakers. Tungsten has a very low vapor pressure.

The alloy is prepared by mixing tungsten powder with five per cent copper and five per cent nickel and heating in a hydrogen atmosphere. Under the proper conditions,



Dr. Croy — from Black Star

THE SLIME ON A SNAIL

... is a lubricant that aids its crawling and that serves as a protective coating. Here, a snail, covered with flour, strips off the powder as it would a mantle and continues its way on the lubricated path it lays down for itself

the tungsten particles are wetted by the liquid copper and nickel, the mass shrinking to form a strong, easily worked material.

Electricity, Evolution, and Epilepsy

CONSCIOUS direction by man of his own evolution, the biological and philosophical implications of which have in recent years been debated widely, comes to the fore again in consideration of the treatment and possibly the elimination of epilepsy.

More than a half million Americans — as many as suffer from active tuberculosis or from diabetes — are subject to epileptic seizures, Dr. William G. Lennox of the department of neurology at Harvard Medical School told the American Psychiatric Association recently, in pleading for an international effort to control and eradicate the disease.

To eliminate epilepsy, man must rid himself of the epileptic gene which transmits the hereditary predisposition to the disease from one generation to another. Two ways of accomplishing this end were pointed out by Dr. Lennox. The first, breeding out the abnormal gene, would demand social human planning, and thousands of years. The second, alteration of the gene by direct chemical means, demands knowledge which we do not as yet possess.

"It is a tantalizing thought," said Dr. Lennox, "that the replacement of, say, a potassium for a sodium ion on a certain molecule, the total bulk of which for all persons living would not be larger than a mustard seed, would eliminate epilepsy from the race. However, we are like elephants set to repair a wrist watch. Our minds are too small and our hands too huge for successful tinkering with the ultramicroscopic wheels of life." The human gene is still beyond manipulation

Yet, Dr. Lennox held, there is reason for hope of a solution in, among other things, the fact that exposure to x-rays, even though it has a mutilating effect, can produce alteration in the genes. Another forward step is the demonstration that an epileptic attack is a disturbance of the normal rhythm of the electrical activity of the brain. The focusing of study on those elements which have to do with the brain's electrical discharge is, of course, the logical consequence of this knowledge, so that investigators have a definite point of attack.

The brain discharges are known to be influenced directly by several factors, including the strength of electrolytes or body fluids carrying electrical currents, the relative amounts of oxygen and of sugar, the acid-alkaline balance of the

F. S. Lincoln, '22



Change-gears on a newspaper press



American Optical Company

INTIMATE VIEWS OF INDUSTRIAL PROCESSES, CONT.

Lens grinding and polishing machine used in making spectacle lenses. Rough lenses are ground on this mount with varying grades of emery until they reach the required thickness. They are then polished by a similar process with rouge

brain cells, and the permeability of the cell membranes. The abnormal rhythm of epilepsy can be suppressed by various alterations in body chemistry, such as simply increasing the carbon dioxide concentration of the respired air. As yet, however, the chemical measures which will suppress the abnormal rhythm have not revealed the specific abnormality of the neurons of epileptics which appears more and more strongly to be the source of the disease. Investigators must, Dr. Lennox declared, work directly with the brains of patients, in the hope of demonstrating specifically what this abnormality is. Laboratory work now is indicating the regions most profitable for clinical research and is confirming clinical observations already made.

Gadfly's Finality

DESPITE his brilliant youthful promise, his early city planning exhibitions, his pre-War campaign in Berlin for a better town plan, his advice to Hameln, Leipzig, Münster, Buenos Aires, and Rosario, the late Werner Hegemann will probably live longest in the minds of his contemporaries as a trenchant and intelligent critic in the fields of housing and architecture. Of him, J. J. P. Oud could say: "I seldom am of your opin-

ion, but I almost always learn from you"; while Erich Mendelssohn perhaps better summarized the wry love architects had for their gadfly when he wrote: "Best wishes for more of your sharp tongue. We will furnish the grindstone."

In the posthumous second and concluding volume of his great critical work, "City Planning, Housing,"¹ Hegemann has furnished the cultured layman with an interesting and readable book on city planning, housing, and civic art. Edited as it was after his death by an associate who permits herself at times more violent statements than Hegemann would have been guilty of, the book is not pure Werner, but it is pure enough.

This work is really more a series of essays on city planning, housing, and civic art than a coherent volume. In it Hegemann gives a studied view of the European housing scene, depicting amusingly the Parisian despair at the contrast between the post-War *banlieue* and the post-War *Vorstadt*, Jean Giraudoux's impassioned praise of *Wannsee* and German nudism, quite complete analyses of how Hindenburg was metamorphosed into an agrarian and of how Hitler failed (*Continued on page 441*)

¹"City Planning, Housing," by Werner Hegemann. Volume II: Political Economy and Civic Art. Architectural Book Publishing Company, Inc., 1937.

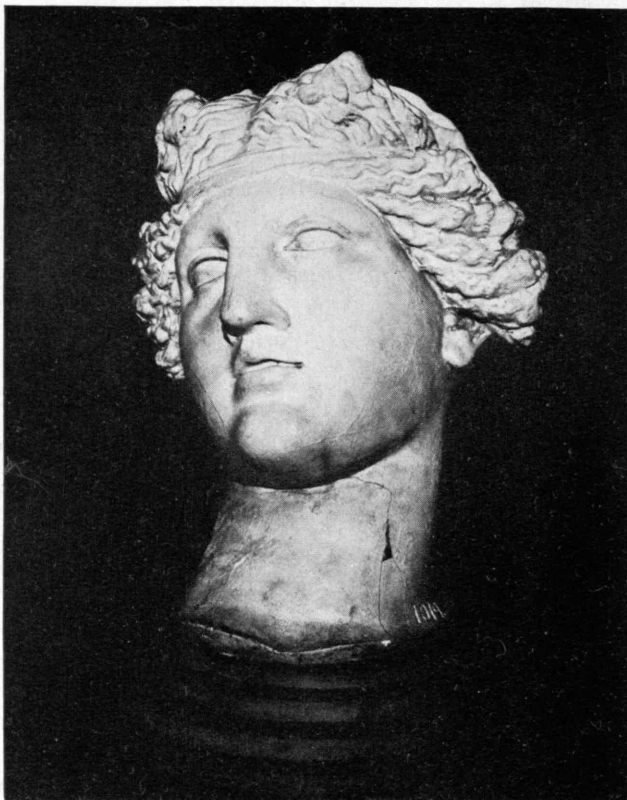


FIG. 1

Compare the effect here with the other pictures, remembering that the same projector located in the same place was used for each



FIG. 2

Here the statue appears to be diffusely lighted from the right with harsh effects due to absence of soft side lighting from the left



FIG. 3

The same light source used in the preceding two pictures can simulate diffuse lighting from overhead

A New Method for Photography Makes the

HERE are six photographs illustrating the difference in mood and effect produced apparently by altering the position of the source from which a statue is illuminated. But all six of these photographs were taken with the light source fixed in one and the same place. The only change made was the insertion of masks or photographic field stops to alter the distribution of the light over the statue. This method, worked out in the Institute's illuminating laboratories by L. R. Steinhardt, '37, under the supervision of Professor Parry H. Moon, '27, appears to offer a simple way of overcoming the two greatest hindrances to correct lighting in museums: disturbing accents of light and shadows cast on walls by excess rays of light "spilled" around the edges of the lighted object, and cumbersome extra equipment necessary to eliminate these accents.

Essentially, the system calls for lighting the statue to the best advantage, with no regard for the amount of bulk and equipment used. Then the statue, thus illuminated, is photographed from three or four points on the walls or ceiling of the room, where permanent fixtures may later be conveniently placed. From the photographs, transparent positives, resembling lantern slides, are prepared, and the backgrounds, or areas surrounding the statue, are blacked out by being painted with opaque pigments. When these treated transparencies are placed in projectors of the lantern-slide type located at the exact points from which the photographs were taken, light shot through them from the projectors will reproduce the artistic effect produced by the original lighting.



FIG. 4

The light source appears to be on the floor in front of the statue and it was, originally, when the photographic stop was made



FIG. 5

Weird effects may be obtained by the use of negative slides in the projector. Here, for example, is the reverse of Fig. 4

Lighting Statuary

Spotlight More Versatile

The face herewith reproduced, which appears to be lighted from several different angles in the different photographs, was actually lighted from only one fixed projector fitted with slides thus made. In Fig. 1, for example, the image of the statue was completely removed from the transparency, and the background was opaqued. The effect is that of a spotlight located at the projector, save that there is no spilled light.

In Fig. 4, the light source appears to be on the floor in front of the statue. It was there when the original photograph was taken. By use of the slide made from that photograph, however, the projector might be placed inconspicuously in the ceiling across the room. Seemingly supernatural effects may be obtained by the use of negatives instead of positives in the projector. It is possible even to make the light appear to come from behind the statue, so that when viewed directly the effect is similar to phosphorescence, and the entire statue appears on fire. Fig. 5, for example, was produced by using the negative of the slide used in lighting Fig. 4; Fig. 6, by means of a negative of the slide used in Fig. 3. For the one fixed projector sufficient to light this mask, three or four would be substituted in order to light a whole statue by the same method.

The process opens interesting possibilities, both practical and esthetic. Easier concealment of obtrusive lighting fixtures in museums and galleries is an obvious result. And if the sunshine coming in through a window touches a statue kindly of a summer morning, the effect might be captured and reproduced by this method come winter evenings.



FIG. 6

The negative of the slide used in Fig. 3 gives this result. The light source is still the same

The Engineering Profession

How It Differs from Other Learned Groups

BY GANO DUNN

IN an address delivered in Boston many years ago on the relation of the engineering profession to other professions, I pointed out that 150 years or so ago there was no engineering profession as we are now considering it, and I dared the speculation as to the future that, in respect to a large part of what, at the time of that address, we called engineering, there might be no engineering profession 150 years hence. Were the grounds for this speculation justified?

If we look at the older professions of the law, medicine, and the clergy, which largely give us our standards of the professional relation, we can see that they have become more or less stabilized as to their subject matter; so that when a man tells us he is a lawyer or a physician or a clergyman, we know something about what he does and what men of his profession have been doing for centuries.

This indication of occupation is not true, however, of the engineering profession. To say one is an engineer does not describe what he busies himself about. Why should this be so in the case of the engineering profession and not of the others? The reason is not far to seek. Not only is the practice of the engineering profession based on a subject matter and a group of activities that not long ago did not exist, but those activities are constantly and rapidly changing in a manner unknown to the subject matter of the older professions. This change in subject matter constitutes an essential difference between engineering and the other professions, and the cause of it is found in the relation of engineering to science.

It is the march of science that makes the occupation of the engineer different today from that of yesterday.

The story of the beginning of the engineering profession as well as of its growth illustrates this truth. The advent of the scientific method and the rapid spread of its use in connection with practical things which began not much more than 150 years ago, called forth the ministrations of a large number of specialists in the application of science to social purposes. There had always been military engineers who made roads, bridges, catapults, and petards; but in the sense we are now considering it, they did not constitute a profession.

To distinguish them from these time honored military engineers, the new men were called civil engineers. In those days civil engineers busied themselves in the whole field of then known science instead of in the narrower fields which civil engineering now embraces. James Watt, for instance, was a civil engineer. These civil engineers, as distinguished from military engineers, began to constitute a new class in the community; and I do not need more than to allude to the extent to which the class has grown in geometrical ratios as to its numbers and as to the varieties of its occupation, until it has

spread its activities into every material department of life. The very foundations of society would be shattered if the class should today cease to exist.

Specialization in this great and growing class has created over 50 branches of engineering sufficiently distinct to be recognized in library catalogs. On account of this growth in scope and subdivision into widely different specialties, occupations in the various engineering branches have become so differentiated that the extremes bear almost no resemblance to each other. Even the grand divisions of the engineering profession represented by the national societies of civil, mining, mechanical, electrical, and chemical engineers, give little more than a hint as to occupation. An electrical engineer may spend his days on the macrocosmic problems of coronas in the long-distance transmission of vast amounts of power, or he may wrestle with the microcosmic subtleties of the multiplex modulation of carrier waves.

As an indication not only of this diversity of occupation but of the rapidity with which change of subject matter has taken place, I will give a few examples. It is within my time that power transmission did not exist. The electrical engineer of that earlier day, in one group, was concerned with the intricacies of direct current commutation or with the then still unsuccessful endeavor to produce an electric motor that would run on alternating current, which was at that time a novelty limited to the field of electric illumination. In another group he was estimating the economic barrier represented by the cost of two wire metallic circuits for telephones, and cogitating whether the priority which telephones shared with the telegraph in the exclusive use of circuits of a single wire with increasingly noisy ground returns was worth the expensive legal fight its preservation was forcing upon him. Mechanical engineers in their sphere burnt midnight oil developing a reciprocating steam engine that would run at a speed high enough for the direct driving of electric generators, in order to make possible the elimination of the grave disadvantages of the ubiquitous leather belt. The successful internal-combustion engine and a useful steam turbine had not been born. In another field the coherer was unconscious of the vacuum tube that was to follow.

I could go on, but trust that I have indicated that the progress of the engineering art in the past has already demonstrated that it would be folly to attempt to forecast in the electrical field alone what will occupy the electrical engineer of 150 years hence.

IT is possible that I have already gone far enough to have suggested what actually constitutes the practice of the engineering profession and sets it apart from the other learned professions. (Continued on page 443)

HOMES OF TOMORROW

REHOUSING AMERICA AT A MINIMUM COST TO ALL ITS PEOPLE

Proceedings of the Conference on Housing held at the Massachusetts Institute of Technology on Alumni Day, June 7, 1937

THE PROBLEM

... touches not merely those who are in the active field of housing but everyone and in particular every engineer. We pay, and pay much, for the existence of submarginal housing, partially because such housing does not carry its full share of the burden of taxes, but more because of the indirect costs imposed through police and penal institutions, public health, hospitalization, and social decay. Moreover, from the present trend toward social amelioration on the part of government, we may confidently expect to pay more in the immediate future; for superimposed upon the current costs inherent in the presence of slum areas, we face the capital cost of remedial measures. It is incumbent upon us so to influence this capital investment that ultimate total current costs may be reduced and maximum social benefit result. —
From the Introduction of Dean Vannevar Bush.

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I. Two upper left—Resettlement Administration, Greenbelt, Md.; II. Two lower left—Modern Mexican Housing, by Esther Born, Photographer, Courtesy of The Architectural Record; III. Right—Pullman Court, by Gibberd, The Museum of Modern Art; IV. Inset—Federal Housing Project, Cambridge, Mass.

Social and Economic Aspects of Shelter

Planning Better Homes and Neighborhoods

BY SIR RAYMOND UNWIN

Chief Officer of Building and Town Planning of the Ministry of Health, Great Britain

THE advance of any human society from primitive, or from pioneer conditions leads to a rapid increase in the number of essential relationships among all the individuals; on the free play and character of these the life and activities of that society depend. Each individual becomes dependent on the actions and services of an increasing number of his fellows; and, in turn, the contributions demanded from each in the form of services which are helpful and in abstention from actions which are disturbing to community life, become more numerous and more essential. During the last century, the progress of our civilization has increased, to a quite exceptional extent, the complexity of this network of interrelations and activities on the smooth working of which the maintenance of advance depends. The growing recognition that this complex community life depends on all the individuals playing their parts in it has naturally led to an extended sense of community obligation to see that all its individual members are fitted and equipped to play those parts properly. The need to secure a certain standard of education for all was early realized as necessary for the working of a society so dependent as ours on literacy for intercommunication: hence, free education for all children. In this country you have further recognized that it is worth while for the community to enable all who are endowed with special mental qualities to develop them to the full, if need be at the public expense.

Experience has shown, however, that education does not cover all that is needed to enable men to play their parts in community life. A certain standard of living conditions has been proved to be equally necessary if people are to coöperate freely with other members of the community. Such coöperation requires standards of health, cleanliness, and decency generally, which cannot be maintained in slums or in the overcrowded conditions of single-room dwellings. Hence it is that practically all civilized countries have been driven to assume a collective responsibility for maintaining such a minimum standard of housing for all their people as may remove any obstacle arising from this cause to their playing the part of good citizens. Experience in Europe has, moreover, shown that the remedy of improved housing is an effective one; that it does, in fact, enable the vast majority of those for whom it is secured to lift their lives onto a higher plane of efficiency and social coöperation. In many cases, well over 90% of slum dwellers moved into better dwellings and surroundings have been able to make good. Better housing has been adopted, not because it is all that is needed to enable the individual to make an adequate contribution to the common life of society, but because it is basic; because without it, the satisfaction of other needs would be ineffective; and because, further, it is the need whose adequate satisfaction the individual is most helpless to secure for himself. This will appear when the economic aspects are examined presently.

Meanwhile, fulfillment of the social purpose impelling communities to assume responsibility for housing involves the satisfaction of many requirements as to the character of the

houses and the location of the dwelling places, on which must depend the degree of success attained. The main aim is to enable those who are rehoused to emerge from the condition of isolation from the community life which results from slum living, and again to take their place in the community. Clearly, therefore, the less they can be segregated into large areas occupied solely by others in the same or little better conditions than themselves, and the more they can be incorporated in complete local communities, the better will be the prospect of success. These local units should include a natural proportion of people in all walks of life and a share of the commercial, industrial, and cultural activities which go to make up a complete community. The more these are secured, the greater will be the opportunities for these people to find their places in the social structure, and the easier will it be for them to share in the contributions which others of varied conditions and attainments make to the common life, and, in response, themselves to contribute in accordance with their capacities.

In England, we generally realize today that, owing partly to the urgency imposed by extreme housing shortage after the War and partly to want of imagination on the part of the authorities concerned, much too little attention has been given to the location of the two million houses built by private enterprise and the one million houses provided by the local authorities, and that still less thought has been given to the grouping of them to form integral parts in complete community units. Much attention was given to the site planning; in the main, the temptation to build congested dwellings in the central areas was resisted; and the new dwellings were rightly built on the outskirts of the towns, where houses for single families could be adopted, each with its own plot of garden, which forms a health-giving and recreation-providing addition to the house. The majority of the dwellings are built at a density of about 12 to the acre, which allows about 300 yards of free garden ground for each family. In some cases this is all allocated to the individual gardens, and public open spaces for recreation are provided in addition; in other cases, the private gardens are curtailed, and land for children's playgrounds and games fields thus provided. In many cases, suitable sites were reserved for some of the most obviously needed communal buildings, shops, and so on. The broader planning considerations which should have determined the location of the housing sites — their relation in size and position to the existing or to new community units — were, however, largely neglected.

English experience most emphatically reveals the great importance of determining the social structure, the promotion of which is sought and of planning each town or district for its realization before, not after, the dwellings for the low-income groups are built. Only in this way can the new dwellings be so placed in relation to the existing town or other developments that their occupants will naturally take their places in the community. Obviously, this aspect raises the whole problem of urban growth and planning; of the integration of increasing

numbers of people, both socially and physically, into local community units. This opens out too large a subject to be dealt with here. Students of towns and town planning are, however, becoming generally agreed that the growth of urban units by haphazard accretions round the fringe and by increasing congestion in the center must be replaced by a more definite and planned structure, in which the central area will be designed for a definite size, and when that is reached, further growth will take place by means of complete additional units, definitely arranged as satellite to the main center, but, as to the daily life and needs of the occupants, largely self-contained. Only on these lines can central congestion be avoided, the social integration of all the inhabitants be secured, and sufficient access to open ground for health, recreation, and pleasure be reserved in a growing city. While the complete development of this form of planning for towns must take time, any large program of housing must either make a great contribution to its realization or create a new and formidable obstacle, according to the way in which it is planned. The social considerations are overwhelmingly in favor of using any public housing program to reduce central congestion and to multiply the number of families which can live and bring up their children in natural conditions of life in a single-family dwelling having some garden land attached.

The experience, which now covers more than 20 years, in regard to health and well-being at Letchworth, England, where these conditions of living apply to the whole population, is very remarkable. Taking the average of the last five years, the official returns show that the general death rate for England and Wales as a whole is 50% higher than at Letchworth; the death rate for infants under one year is 84.5% higher, and the death rate from tuberculous disease is 100% higher. The returns from a Friendly Society show that the working days lost per person through sickness are only two per annum there, while they are over four in the neighboring towns, and just under four for England and Wales. If the comparison were made with the central areas of large towns, the contrast would be even more striking. The birth rate is fully up to average, so that if the Letchworth figures could be extended to the whole English population, they would put quite a new aspect on the present crisis in population trends. Only a little imagination is needed to realize what these figures indicate in reduction of human misery and increase of general well-being. In confirmation of the strict connection of these results with the housing conditions, it is found that the figures for Welwyn, and even those for Wythenshawe as far as yet available, are following along the same lines.

Fortunately, the method of housing which is so overwhelmingly superior socially is also far more economical in capital costs. In England, tenement or apartment blocks have been built only in London, and, to a less extent, in a few of the larger towns. Even in towns where flat dwellings have been most used, they form but a small proportion of the dwellings erected since the War. The London County Council had, up to March, 1935, built 53,289 cottages and 15,260 flats. The Liverpool Corporation, up to March, 1936, had built 27,128 cottages and 6,391 flats. The results prove that the better type of housing in cottage dwellings at 12 to the acre is far less expensive. Comparing the central provision of the same inside living space in tenement blocks of 40 or 50 to the acre with that given in cottage dwellings at 12 to the acre on the outskirts of towns, the extra capital cost per family varies from \$1,200 in the provincial towns on cheap sites, up to \$2,500 in some cases in London. The costs of creating new Garden Cities show that such savings, if available, would be more than necessary to enable a fully equipped satellite town to be provided for the people housed. Indeed, the total capital value of an English town, including all the privately owned and remunerative property and the improved land values, based on a

20 years' valuation of the net annual assessment for local rates or taxes, will fall between \$2,000 and \$5,000 per family, a figure less than is being spent by the London County Council to house some of their families in blocks of flats. For example, the capital value of the net assessment on this basis for the Garden City at Letchworth, is \$2,200. For the city of Manchester it would be about \$3,475. In many cases, London is spending more than these figures to rehouse a single family. American figures are higher: *e.g.*, based on 1930 population and four persons per family, the comparable figures for Boston give a really assessed valuation of \$9,292 per family; those for Minneapolis, \$7,408.

The comparison of costs in two different methods of housing has already taken us from the social into the economic aspects of housing. It must also suggest that even in the most urbanized communities, the dwelling represents by far the most costly item of capital equipment per family for the town; its cost may sometimes exceed that of all the other urban capital equipments put together. Hence the importance of realizing the economic considerations affecting the supply of dwellings, and those differentiating them from other purchasable commodities. When people buy coats or boots, owing to habit of thought, to their short life, and to the personal attachment or individual fit, the price paid is regarded as mere expenditure. Fluctuations in the price of such articles may influence the demand, temporarily, but have no permanent effect, except as increasing or reducing the cost of living. No one regards payment for a coat as an investment. Not so, however, with a house. Even if it is bought for the purpose of occupation, it is primarily regarded as an investment, only to be made when there is a probability that the whole, or at least the greater part of the price originally paid could be recovered if and when sold. The smaller the house, the more generally does the value depend on the element of necessary shelter which it affords; consequently, the less does any want of up-to-date character, latest modern equipment and amenity, or of fashionable position tend to lower the value as the house grows older. Moreover, in developing urban areas, the value of the location, either as a place for shelter, or for other possible purposes, frequently increases; this may well more than balance any depreciation in the value of the building. Many occupying owners have, in fact, sold their houses after some years' occupancy for more than they originally paid for them. Members of the lower-income groups, however, can seldom afford to be home owners. They do not inherit and cannot accumulate enough from their low incomes to buy a house. They have little security to offer for credit; and to pledge what credit they have and tie up all their prospective savings for many years in a dwelling house is to incur great risk. They may very likely have to leave the dwelling to follow their work; if they do leave, they must almost necessarily sell at a loss, or even forfeit the house, because they cannot maintain their installments. This use of savings is of very doubtful wisdom even in many of the cases where it is not at the moment impossible. Consequently, for all practical purposes, the lower-income groups must be regarded as house renters.

If houses are to be available for renting, someone must advance the capital cost as a pure investment, looking to have it repaid with interest and profit over a period more or less protracted. In order to keep up the supply of houses, therefore, prices and rents obtainable at any time must promise an adequate return on the costs of production then ruling. This applies absolutely to new houses, but it applies also to all existing and comparable dwellings, subject only to some deduction in the case of capital value for any considerable diminution in the remaining life of the building, and in all cases for palpable inferiorities in the older dwellings. This last deduction is generally diminished by the influence of scarcity and by the fact that improvements in the new houses tend to be in the form of

equipments or gadgets which are not much missed by the poorer tenants. Consequently, as long as the dwellings are decently maintained, the rents for the lower-income groups tend to increase with age, rather than diminish. This has been very noticeably the experience in England and other older countries.

The following table gives the prices at which houses containing a living room, kitchen, and three bedrooms, could be, and were built at different periods during the last century, and the weekly rents needed to show a gross return of $7\frac{1}{2}\%$ on the cost, which is about the average rate that will today cover interest, amortization, repairs, managements, and local taxation on municipally-owned houses:

<i>Period</i>	<i>Cost</i>	<i>Monthly rent</i>
75 years ago.....	\$ 600	\$ 3.75
50 years ago.....	750	4.69
25 years ago.....	1,000	6.25
Today.....	1,800	11.25

If the houses built in those past periods had been available today at the rents which sufficed to pay a return on their original cost, our housing problem at home would have been far simpler than it is. Wherever these houses were decently built, and have been properly maintained, their rents have risen in sympathy with the rents needed to show a return on the rising cost of building similar dwellings at subsequent dates. Many of them are let today at rents double those which were needed to show a return on their costs. The appreciation of this tendency is important to an understanding of the housing problem, because it is, in fact, one of the chief causes leading to the recurrence of that problem. Unless some provision can be made to meet this difficulty, no solution of the present housing difficulty has any prospect of preventing its recurrence. I have not comparable figures for the United States; probably you could find them in some places. But in many parts it seems that houses were never built for original occupation by the lowest-income groups; they were built for the better-to-do folk, whose leavings the lower-paid families moved into — a process of “all move up one place” similar to that adopted at the Mad Tea Party in “Alice.” There is every reason to expect that the tendency which has prevailed in England during the last century will prevail also in the United States, for the cost of dwellings depends almost entirely on the standard of living of the workers in the building crafts and material-making industries. In civilized countries, the standard of living has tended to rise steadily. One can only hope that this tendency will continue; if it does, the cost of shelter, which has risen steadily in the past, is likely to continue to rise for a long period. Moreover, the workers in the building and allied crafts and industries usually enjoy a standard of living well up in the scale of labor earnings current at any time.

The result of this is that the cost of new dwellings and, so, the necessary rent based on that cost at any time are beyond the reach of the lower-income groups whose wages are much lower than the average earned by those concerned in producing the buildings. Shelter, moreover, like many other necessities of life, cannot be reduced in amount or in cost pro rata with the diminishing incomes. Indeed, in the cost of buildings providing only needful shelter and necessary sanitary equipment, without any frills, the cost of the area sheltered increases rapidly as the space provided per family is reduced. This follows because the constants in any dwelling, such as the site, road, sanitary and other equipment, sewer and other services, with the connections to them, represent a very large constant item, not diminished appreciably by reducing the size. Consequently, the smaller the sheltered area per family, the higher must be the cost per square foot covered. It is not surprising, therefore, to find that the lowest-income groups, who can least afford the drain on their resources, have often to pay the largest propor-

tion of their income in rent. A recent inquiry among 150,000 tenants revealed that those having incomes of \$4,000 per annum paid 15% in rent; those having incomes of \$2,000 per annum paid 25% in rent; and those having incomes of \$1,000 per annum paid 30% in rent.

If all our people are to be housed up to the standard needed for health and reasonable social efficiency, clearly there must be a provision of a sufficient number of adequate dwellings at rents which each income grade can afford to pay. If the minimum adequate dwellings cannot be built within the cost which such low rents will meet, then there must be some form of grant in aid of rents, for the same reasons and on lines similar to those which have led to and justified the general adoption of grants for education. The subsidy, or grant, will need to continue until such times as the lower incomes can be raised to meet the needed rents. This would indeed meet the present problem; but what of the future? If these dwellings which are subsidized, or which are occupied by tenants who are assisted to pay the rents, remain in the hands of private owners, or pass into their hands, then as the standard of living improves and the tenants become more able to pay the rents now needed, the cost of building new houses will rise. More rent will be needed to meet the charges on them; then the owners of the old subsidized houses will be able to increase the rents of them also; and a position will again arise when the lower-income groups cannot afford the rents based on the costs due to the improved standard of living.

There seems to be only one solution for this problem: These houses, the rents of which, in whatever form, are subsidized, must be secured against any future rise of rents beyond what the lowest-income groups can afford to pay. They must, in fact, be taken out of the sphere of private enterprise, which looks to make a profit on them, and put into some form of public, or trust ownership, where they can be held and can continue to be let at figures based on their original cost, and not at figures which approach those needed from time to time to meet the higher costs of later building periods. It is this consideration which adds such importance and value for the future to the pool of over one million dwellings now owned and administered by the local authorities in England and Wales. So long as these houses are so held, there will be no reason for raising the rents beyond what meets the outgoings, however much the costs of building may continue to rise. They will represent a reservoir of dwellings available for the lower-income groups at rents which they can pay. As the costs of building rise, due to the rising standard of living and wages of the building industry, the incomes of the lower-paid groups will rise also. Their rent-paying capacity will increase, and in 10, 20, or 30 years, they may be able to pay the present economic rents, without subsidy or aid, more easily than today they can pay them when sufficiently reduced by the subsidy.

America is a much newer country than England; the evolution of its civilization is in an earlier stage and therefore I should judge that the prospect of steady rise in the standard of living is more certain and its progress likely to be more rapid than can be expected at home. While, therefore, the call for subsidy or grants in aid of rents may be more urgent and on a larger scale here, the chance that improved conditions may reduce, and ultimately terminate that need, seems better than is perhaps the case at home.

If, then, the past trend in Europe may be taken as any guide to the future trend in America, housing by public authorities, so far from representing an extravagant expenditure, is likely to prove, in the long run, a good investment. Be that as it may, however, the fundamental distinction between what is expenditure and what is investment should be clearly appreciated. The providing of dwellings to be let for rent may prove to be a good or only a poor investment, but remains an investment. When a public authority builds dwellings for its lower-

income groups, it transforms idle potential credits into revenue-earning assets. If properly built, those assets remain to earn a revenue over a long period of years. The money spent is not part of the expenditure of the authority; it is a wise investment on which there will be a substantial return, partly in cash, partly in saving a considerable sum which is annually expended on all slum areas, and partly in general social improvements. There will be for some years, and there may be until the amortization is completed, an excess of expenses for interest, repairs, and so on, over the revenue received in rents. This annual sum is the expenditure involved, and the only expenditure. It is made to secure the benefits claimed for good housing. If it does in fact secure them, it will be one of the most worth-while expenditures which any public authority can make. If it should prove at any future date that the expenditure is not beneficial, or that the benefits can be secured with less expenditure, or ultimately that they have been secured and that the tenants have become able to pay rents sufficient to meet all the charges, then the expense will be reduced or stopped and the investment will become a paying one, even if judged on the restricted cash basis only. The point to remember is that a revenue-earning asset has been created, competent to pay its way, and that the annual expenditure in the form of grants in aid of rents, to secure the benefits of slum clearance and a solved housing problem, will have to be made only as long as needed to secure those benefits and as long as the benefits are deemed to be worth the expenditure.

This point has been stressed because, on the one hand, there is a tendency to regard money spent in providing houses on the same footing as much other expenditure which may or may not be wise and fruitful, but leaves behind no tangible assets capable of earning a revenue to meet the annual charges for finances, and so on. Housebuilding is quite different from this. Because of this difference the large sums invested by English municipal authorities in the provision of dwellings do not count in assessing the amount of debts which they may incur, which amount is limited by the sum of their assessment for revenue and the proportion of that sum levied in the annual rate. The other reason for stressing this aspect of housing is that if the housing problem is to be solved, the United States is faced with a very large investment in dwellings by public housing authorities and is likely to be faced for some years by a large annual expenditure in the form of grants in aid of rents to enable the lower-income groups to occupy adequate dwellings until such time as the incomes of those groups rise sufficiently to meet the rents which would suffice to pay all outgoings on the dwellings. In these circumstances, a proper understanding of what is investment and what expenditure, what is the nature of the liability for future expenditure, the prospects that the liability will be a diminishing one, and the extent to which it will be within the control of the authority to reduce it, or stop it, at any future time, are essential.

Some idea of the extent of the problem may be gained by comparing the rent-paying capacity of the lower-income groups with the rent needed to meet all the charges on new dwellings of a standard which can be regarded as affording adequate housing, and by taking the number of those whose incomes fall below the level which can afford the rent of such an adequate dwelling. Mr. Allie Freed has suggested \$2,500 per dwelling as a figure which might be contemplated, but one which has generally been much exceeded in recent housing schemes. On the other hand, \$1,000 per room has been the cost of one of the most carefully designed and executed schemes of flat dwellings outside New York on land of reasonable cost. Counting the kitchen and bathroom as one room, an average of 4.3 rooms per dwelling is probably the lowest which could be taken to give adequate accommodation for families. At \$1,000 per room, this would mean a cost of \$4,300 per dwelling. If we take these two figures, they should indicate approximately

the range of costs which will have to be faced in a well-organized housing program. Every effort should certainly be made to avoid needless and uneconomical costs. A housing program undertaken by public housing authorities, who are to hold and let the houses during their lifetime and to amortize the capital cost over a long period such as 60 years, affords opportunities for some substantial economies not open to private enterprise; but equally it justifies some classes of expenditure which speculative builders are apt to shirk. Work on a large scale on a well-planned and regular program admits of many economies in the purchase of land and in its development, in the purchase of materials, and in the organizing of the building operations. Such regular work would, moreover, seem to afford reasonable ground for making some arrangement with the building crafts, who enjoy a specially high hourly rate of pay owing to the relatively short season of work which can be counted on. If regular work the year round were offered by employers working on a continuous housing program, possibly some arrangement guaranteeing a certain minimum yearly income would justify the crafts in accepting on such jobs a lower hourly rate. This plan would seem worth exploring as soon as the housing authorities are in a position to offer their *quid pro quo* in the form of continuous work.

On the other hand, the conditions of public ownership suggest the prudence of securing good construction which will be durable and involve only low maintenance costs, and of the adoption of standards in size, character, equipment, and amenity, which will be likely to maintain the letting value of the dwellings throughout the period of amortization at least. Of these items, that of equipments can be most easily supplemented or adjusted from time to time, if general standards rise, provided that reasonable space for them is arranged in the building; and space, be it remembered, is relatively the least costly element in the problem. For example, there may be many cases where the saving in rent and running costs by the omission of a refrigerator or central heating apparatus would for the present both reduce the loss to the housing authority and save the tenant from an additional monthly expense for refinements to which he has not been accustomed. Such apparatus can be added at some future date in the space left for it, at little more than the cost of installing it originally.

I find that under the conditions prevalent, the lowest rent to cover all charges, including interest, amortization over 50 or 60 years, repairs, management, and local taxation, is about 12% on the gross cost. In England, the municipalities manage to cover these charges, though usually without any heating, and perhaps with less janitor services, for 7½%. This is a very large difference, one which affects the rents more than any economies likely to be effected in the cost of building. This aspect of the problem is worthy of careful study. Meantime, the figure of 12% on the gross cost must be taken for a rent that will clear everything. When dealing with the lower-income groups, the proportion of their incomes which they can afford to pay in rent can be taken only as an approximate average. If any adequate standard of nutrition and other living expenses per family were taken as a first charge on the income, then in most cases there would be little or nothing left for rent. Assuming, however, that rent ranks pro rata with other family expenses, an arbitrary average figure of 20% of the income will certainly represent the maximum which should be paid. On this basis, families having an income of \$500 per annum could pay \$8.33 per month in rent; those having an income of \$1,000 per annum could pay \$16.66 per month; and those having an income of \$1,500 per annum could pay \$25.

Taking the two costs of \$2,500 and \$4,300 as indicating the range per dwelling within which the cost per house is likely to fall, we get, at 12%, a range of rents from \$25 to \$43 per month. Comparing these figures with the rents which we have assumed might be payable, the following are the results:

	Monthly rent	Deficiency on a \$2,500 dwelling per month per annum	Deficiency on a \$4,300 dwelling per month per annum
Income payable			
\$ 500	\$ 8.33	\$16.66 \$200	\$34.66 \$416
1,000	16.66	8.33 100	26.33 316
1,500	25.00	nil	18.00 216

From the investigations of the Brookings Institution, there would seem to have been the following percentages of families in 1929 with earnings up to, but not exceeding, the respective figures given above:

Incomes up to \$ 500 = 7.6%	on 2,280,000 families
Incomes up to \$1,000 = 13.8%	on 4,140,000 families
Incomes up to \$1,500 = 21.0%	on 6,300,000 families

Total	42.4%	12,720,000 families
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These figures imply that there are at least 12,720,000 families who could not afford to pay a rent that would meet the necessary annual charges on adequate new dwellings. To enable them to pay such rents, grants ranging from \$200 per annum downward in the case of dwellings costing \$2,500, and from \$416 downward in the case of dwellings costing \$4,300, would be needed to enable these families to occupy new dwellings. For what proportion of the twelve million-odd families there are available dwellings already built at rents lower than those which must be found for new houses, I have no means of estimating. But taking the lowest cost and providing the grant for only the two lowest-income groups, a sum of \$870,000,000 annually would be needed to enable the 6,420,000 families to live in new dwellings. That figure could be reduced to \$543,750,000 if the English relation of rent to cost, *i.e.*, 7½%, could be substituted for the 12% taken as prevailing in America. These figures are not given with the intention of producing dismay or despair, but to show that the problem is both serious and extensive; one which will only be solved within reasonable time if it is envisaged as a whole and tackled in a realistic and comprehensive manner.

The income and resources of your country are such that the problem is well within your power to solve, even if the solution should involve an expenditure each year for some time greater than the figures now named. Nonetheless, it must involve an effort large enough to justify the careful study of the problem as a whole, and the adoption of skilled planning to secure that all the parts of the problem are properly related.

The community, for housing purposes, falls into three sections: There are those who enjoy incomes sufficient to enable them to buy houses or to pay a rent sufficient to tempt private enterprise to provide them with houses at a rental. The remaining families may, according to our experience at home, be again divided. There are those who can afford to pay the minimum rent which will meet the charges on a dwelling erected with all the economies as to land purchase, wholesale production, cheap capital, long-term amortization, freedom from risk of empties, and so on, which a public authority, not working for profit, can adopt. These entail much thought and activity on the public authority, but demand no expenditure or loss, merely an investment which is self-liquidating. Finally, there are those who cannot, or at least cannot without sacrifice of the subsistence necessary to maintain their health, pay a rent equal to the charges on any new house which is up to the standard that the community must demand for all its members. These can be housed only if some assistance in one form or another is available.

The needs of the first class are likely to be unusually great in the near future. The rapid increase in the number of families which is likely to take place when the average size of a family diminishes has greatly increased the need of dwellings in England, and produced the recent unprecedented boom in

private enterprise building which is taking place in America also. The cessation of building for the years following the slump has greatly added to the need, while increasing prosperity must lead to the desire of those who doubled up during the depression again to occupy separate dwellings. For these reasons it is safe to predict that private enterprise is likely to have its work set during the next few years to meet the demand of the first class named.

The needs of the second class might very well be met by consumers' housing societies, or limited-profit housing agencies, as provided for in the Wagner Housing Bill. Failing these, they must be met by public housing agencies. The latter alone will be in a position to deal with the third class who must obtain houses at rents below what would meet the charges, or must be assisted to pay the rents. All houses acquired or built for these public housing agencies, whether let at cost to tenants belonging to the second class, or let with assistance to those in the third class, should remain the property of these public agencies and be available during their useful life to assist in the housing of the lower-income groups.

The housing problem, apart from the three classes of tenants, remains to be considered further in several parts which need to be related in any complete program. The following are the chief sections which may be enumerated:

(1) The provision of adequate new dwellings at rents which the prospective tenants can afford; (2) the maintenance in a safe and sanitary condition, or the reconditioning of all houses capable of affording healthy and adequate dwellings; (3) the closing and demolition of all dwellings unfit for habitation, and the clearing of all slum areas where such dwellings are congregated; (4) the placing of all dwellings provided by housing agencies under skilled and helpful management to secure the maximum social benefit from the improved living conditions.

As regards the third item, which usually involves additional costs due to compensation and clearance, the fact must be remembered that where there is acute shortage of adequate dwellings, procedure under Section (1) is more effective than that under Section (3). Every house built under Section (1) adds to the number of dwellings, while under Section (3), action does not increase the number, but replaces defective houses with good ones, the number remaining the same.

If the Wagner Bill becomes law, the Federal Housing Authority will naturally seek to envisage the housing problem as a whole, to estimate the extent of need and the contribution which each section can best make toward satisfying the need. The state legislatures may well need to devolve responsibilities and powers upon the municipalities to deal adequately with the several sections enumerated. The responsibility for the actual provision of the dwellings may well come to rest more and more on the local authorities, aided financially by the states and the Federal government.

There are certain other aspects of the problem which English experience leads one to fear may be overlooked. As regards planning for the dwellings, the importance of considering the town as a whole and endeavoring by means of any public housing to secure a better distribution of population and industry, and a better social relationship of the various sections of the community, cannot be overstressed. Only an undue concentration of attention on purely local needs and difficulties can lead to any seeming justification for the segregation of the poorer people or the congestion of their dwellings, or of industry in the central areas. Consideration of the whole conditions will reveal that there is almost unlimited space available and that the difference or saving in the size of a town that can be effected by congestion or by increasing the density of dwellings is surprisingly small — almost negligible in fact. For example, in a town like Birmingham in England, having about a million inhabitants, if the average density of all the dwellings were

varied between 40 and 10 to the acre, the radius of the town would vary only between four miles and $5\frac{1}{8}$ miles, a difference of $1\frac{1}{8}$ miles. With any proper planning of towns, therefore, the density of the dwellings can be determined on what is best for the families occupying them and need not be restricted by any fear of want of space.

The area of the United States exceeds three million square miles, and the present population may be estimated at 32,000,000 families; if they were all gathered in cities laid out on the low average of only 10 dwellings to the acre, and if a like space, a very generous allowance, were allocated for industrial, commercial, and other uses, only ten thousand of those square miles would be needed. In other words, an insignificant patch on a map of the United States, measuring 100 miles each way, would suffice to hold the whole population in urban areas on a generous scale in which every family could have its own dwelling with land attached. Not only is there ample space for all needs to be generously satisfied; but even if attention be concentrated on the piece of land to be developed, crowding dwellings upon the land is a most uneconomical procedure. The expenses of development per house grow steadily as the density is increased beyond 10 or 12 to the acre. This increase balances any saving per house due to dividing an acre into more plots, except where the price of land is high. Moreover, even in such cases, the area of each plot is diminished so rapidly by increase in density owing to the increased proportion of the acre occupied by roads and buildings, that the cost of the available land per square yard becomes always rapidly greater as the density of dwellings is increased, unless, of course, the dwellings are piled one on top of another, in which case other considerations arise.

High density is usually justified on account of high land values; on the other hand, high land values are directly promoted by high density. To seek relief from high values by adopting high density is just as reasonable as to seek relief from high temperature by stoking up the stove. If the height and density of dwellings be limited by law or sufficiently prevalent custom, the value of the land for residential purposes must also be limited by the amount which the permitted number of families can afford. When dealing with dwellings for the low-income groups, not more than one-fifth of the rent can be afforded for ground rent. With a rent of \$25 per month, \$5 per family is all that can be afforded for rent of the land. If 10 families are housed on one acre, the price of the land on a 20 years' purchase basis would be \$1,000 per acre. If 40 families are housed in flats, the price would go up to nearly \$4,000 per acre. The seeming relief from increased density, if such it can be called, is not due to the tenant getting a cheaper plot, but to his paying the same price for a much smaller and, for all

purposes, much less valuable plot. With 12 houses to the acre, there are 300 square yards of land per family for garden or recreation ground; with 40 flats to the acre, there are only 82 yards per family. To seek relief from high land values by increased density is a short-sighted and futile expedient. No one is benefited except the owners of the limited plots on which the high density can occur, and they benefit at the expense of other owners and, in all probability, at the expense of the total land increment available. For overcrowding, as has been explained, is subject to the law of diminishing return. The costs of development increase and the real value of the plots diminish in a progressively greater ratio. Tenants on the whole can afford to pay more for the more efficient and more attractive plots for their houses.

There can be little doubt as to the superiority of the single-family dwelling in all cases where there are young children. There is no doubt also that every million dollars invested will provide far more of these better dwellings built on low-priced land outside the center of the town than it will of flat dwellings built on high-priced land in central positions. Further, there is no doubt that many, if not most industries can be more efficiently carried on in modern one-story factories built on spacious sites outside the congested centers than in cramped quarters on the restricted and expensive sites in those centers. All this points to the wisdom of seeking to do as much as possible of the vast amount of low-rented housing that is called for, where it produces the best results, is cheapest, and will encourage efficient industry. Indeed, a fraction of the sums saved by adopting this form of housing, if used to promote the development of such industry and the provision of all that is needed to create self-contained satellite units, would transform the mere provision of dwellings into a means of solving, on the best-known economic and social lines, the chief problems presented by modern urban congestion, slums, and physical deterioration.

America is faced with a great, a difficult, and a costly undertaking in providing the minimum of decent housing which will enable all its citizens to play their parts in the life of this great community. But at the same time, America is given a unique opportunity to remove many of the worst evils of congestion and physical deterioration and thus to raise the status and improve the character of life in her cities, and at the same time to improve the relationship between the rural and urban modes of life. This opportunity can be taken if the solution of the housing problem is sought on the best lines based on realizing plans in the interests of the whole community, instead of being sought in a parochial spirit of relieving local pains by local patches, which must result in the minimum of benefit secured at the maximum of expenditure.

How Better Houses Will Be Built

The Question Mark of Prefabrication

BY JOHN E. BURCHARD

Vice-president of Bemis Industries, Inc.

IN the guise of housing literature, we of the United States have been dazzled the last many months by class propaganda wearing no more veils than Gypsy Rose Lee. Workers are urged to arise, to demand a housing, theirs by right, are told that high wages for the building trades are just but that high interest for the moneylender is unjust.^{1*} We hear with more reason unceasing complaints against the risks responsible for high financing costs, the wasteful methods of distributing materials, the failure to use and value land rationally, the high cost of our subcontracting system, the terrible burden of real estate taxes caused in large part by a moribund municipal conscience.²

Under all of this smoke of conflicting testimony he would be slow-witted indeed who did not suspect some fire. On this day in this year, 1937, he would in fact be a veritable Bourbon who would dare affirm that we have no housing problem. It is also self-evident that it is a complex problem. One step forward we have perhaps made: Whatever our thought as to possible solution, we will now agree with some unanimity in stating what the problem is. This is my conception of it: In every society there are families which do not earn enough to occupy shelter of a quality which that society deems necessary. We know the penalties of letting very many people burrow in the Nibelungen warrens of substandard shelter. We are certain that indecent housing definitely breeds pestilence — economic, physical, and moral; that this pestilence will attack rich and poor alike. Without a Faubourg St. Antoine there might never have been a French Revolution.

Confronted with this problem, the first thing a scientist might ask would be: "What is this minimum standard of which you speak? Assign me a value for this x and perhaps I may solve you a y ." That, gentlemen, has scarcely been the method in the cloud-cuckooland of housing. More characteristic is the student of standards who explores the housing of Europe, admires and lauds the accomplishments of Socialist Vienna, of pre-Nazi Germany, of the London County Council, but, returning to our shores, is stung somewhere east of Ambrose Lightship by the mosquito of American advertising, goes mad with the sting, and, setting foot on 14th Street, rushes to the publisher to raise the housing ante. In this unobjective shifting of standards, which might proclaim, for example, that it is all right for a German but all wrong for an American to walk up five stories, we have one of the reasons why we have so many minimum housing specifications incapable of fulfillment and so proved in time-worn after time-worn experiment.

So our first task must be to set a true and objective standard for minimum shelter, x . We might understand it as long as it can be described in terms of so many square feet of space, so many cubic feet of air, so many energy units of heat and light, such sanitation as would restrict the growth of specified bacteria to a specified rate. But soon we find we are called upon to decide whether every householder shall be freed from the burden of coal stoking, whether every person must have a private stall shower, whether each child must have opportunity to harden his class-conscious buttocks on a public slide. Small wonder we then cry hold. The standards have not yet

been properly defined; they will not be properly defined until engineers and natural scientists approach the problem with their objective attitudes.

For the sake of argument, let us now assume, however, that a reasonable minimum has been established and accepted. We shall then find, and we need not indulge in any quantitative debate about it, that under any existing culture too many families do not earn (and notice I say earn and not acquire) enough to justify their living in that standard of shelter which society has called minimum. If the residue which, logically speaking, does not deserve to live in such housing — but which we think must so live for the protection of the rest of us — if that residue be small, sentimental capitalism will as in the past support it, logical communism will as in the past liquidate it.³ But when the residue is large, it may become too expensive for capitalism to support, too powerful for communism to liquidate. That is the immediate dilemma. Current thinking sees only two ways to resolve it: to lower the amount of human effort required to produce the shelter minimum or to subsidize a very large group.

No prefabricator, I am nonetheless here in the role of the prefabricator. Sympathetic to his point of view, I have no hesitation in proclaiming his philosophy; friendly to the individuals in the work, I have equally little hesitation in criticizing what seem to me to be their errors. The prefabricator rejects formal subsidy, though he recognizes that probably for many years to come it will be impossible to eliminate the concealed subsidy which now exists.⁴ He has good reason from American record to fear political machination, good reason from European record to fear national bankruptcy, good reason from record of all history to fear the damage done to the moral fibre of a worth-while population. He knows that bread and circuses are easier than thinking; he knows that the first American reaction to anything is to pass a law, but he has seen abroad that government builds no more cheaply than the individual and that subsidies clearly tend to preserve bad features of the *status quo* rather than to eliminate or reform them. He believes that a government honestly interested in the housing problem would prefer a five million dollar a year housing research council to a five billion dollar a year housing program. And being poor himself and unable to afford the research he knows he ought to carry on, he would welcome such a council. He rejects subsidy.

With subsidy abandoned, the only alternative is to reduce the cost of the shelter unit. There are many ways to do this and some of the others you will hear from other speakers. The prefabricator recognizes the savings which can be made through reform of any element in a thoroughly unregenerate situation. But he has concluded that if he can save 25% of the cost of the building or 20% of the capital cost of shelter — no very dramatic achievement as compared with others of American industry — he will accomplish more. In reducing capital cost, he will reduce most of the annual charges; his house, a better risk, will justify a lower interest rate; better built, will cost less to maintain; planned with more foresight, will be less early obsolete. His approach permits him to ignore the otherwise vital housing questions of home ownership versus rental, of group versus detached housing, for the savings

* All footnotes for this paper will be found on pages 419 to 420.

he can make may be credited to owner or to renter, to individual or to community alike. Why do we doubt his statement?

We doubt it because, despite ballyhoo, despite eager public interest, he has now been building houses for years but has yet to build a cheap house. The unvarnished facts are that prefabrication studies have been made at least since the turn of the century, that they have cost their students untold worry and measurably large sums of money, that the money spent rang true on the counter while the brains employed were no mean brains, and that there still is no evidence of tangible and positive accomplishment. Such a result makes us question the very hypotheses of prefabrication. Let us so question them.

First hypothesis is that the annual demand for new houses is large enough. Disregarding shortage, the present demand in the United States can conservatively be set at 750,000 units a year and the demand will increase.⁵ Suppose now that a prefabricator gets 10% of that market, certainly no trust-making assumption. This will mean 75,000 houses a year, or 250 a day. True, this does not suggest the large-scale daily production of the automobile industry. But production must here be estimated on a parts basis. This much business, for example, would mean the daily production of 6,000 essentially identical wall panels and 12,500 essentially identical floor panels at a minimum.⁶ That begins to look like large production. It is difficult for a fair-minded person to quarrel with this hypothesis.

Second premise is that building practices can be improved by concerted study. The prefabricator does not think the operative builder a dolt. But he knows that the present builder must deal with the materials and the labor he has, that he may be thoughtful enough though not powerful enough to force any changes in the materials and tools given to his hand. Consequently, his methods are not in harmony with those of other phases of American industry. Of the disabilities of the building industry we need scarcely discourse here. They have been rehearsed often enough.⁷

Finally, the prefabricator believes that his carefully planned factory production, field erection, and skillful distribution can produce a better and cheaper house. He looks at the record of change in the years 1914 to 1936. He sees that a workman of 1914 had to labor 709 hours to clothe a family of four, now 349; 187 hours to buy the crude washing machine of that day, today 71; 3,000 hours to buy the 1914 motorcar, 859 to buy today's; 105 minutes to buy an electric light bulb of 1914, which was so short-lived it was regularly sold in packages of 50, today 12 minutes. Meanwhile, at best he can hope to buy the average house of today for not less than 5,200 hours, while in 1914 it might have taken him 6,400 hours. The relation of house costs to these other things is clearer if we correct the man-hours of 1914 by introducing a factor which would take care of the 92% increase in average wages up to 1936. On such a basis we find that the clothes of today have actually improved in price (as opposed to better buying power) so that they cost 92% of the price of 1914, washing machines are 73%, automobiles, 54%, electric light bulbs, 22%, while houses are now 157% of what they were then.⁸ The prefabricator does not believe that the house has improved more than the electric washing machine, the motorcar, the light bulb. Even the paint which now goes on the house cost 59 hours of work in 1914, 25 now, but the house stands there like the Rock of Gibraltar, except that my simile is poor, for mountains get smaller, not bigger. When seeing this, the prefabricator concludes that perhaps something similar could happen to housing. Does that qualify him for Bedlam?

He goes a little further with this part of the hypothesis. He thinks that more shopwork will reduce costs of labor,⁹ that he can buy and use materials more cheaply and more efficiently,¹⁰

that he can reduce field costs,¹¹ that he can buy equipment more cheaply and install it more efficiently,¹² that he can reduce maintenance costs through the use of better-wearing materials,¹³ that he can cut financing costs because of the assignable and standard value of a trade-marked article of any given age. This part of the hypothesis is, of course, to be tested only in the crucible of business experience. It sounds sufficiently plausible so that the small failures of the past scarcely disprove it.

We must then, however, seek to discover reasons for failure outside possible fallacy in the hypotheses themselves. If we can discover such reasons, we may well bolster our faith in the basic truth of the hypotheses. In enumerating some of these reasons I shall assume that I am speaking to a group, many of whom are not familiar with the specific details of specific prefabricators. I shall therefore not cite chapter and verse. I am sure you will be able to fit some of the cloth to some of the prefabrication you know. For of course no individual prefabricator can wear the complete suit of clothes I shall now set out to cut. I shall not have time to cover all the many and complex causes of failure, but shall discuss some of the more spectacular and annoying causes of failure to the neglect of others in the guidebook.¹⁴

Full 90% of the public discouragement with prefabrication lies in stupid approaches which have had nothing to do with the real thesis of the real prefabricator. Their progenitors have been three. By far the biggest group have been the housing amateurs who have preferred to build a \$5,000 house for \$25,000 than study what they were doing. There have been and still are swarms of these amateurs in housing. Why?

I think I know why. The amateur prefabricator lives in a world where almost everything, even the motorcar he used to get out and get under, has become too complex for his feeble tinkering. Confronted with a problem in spectroscopy, he yells for a spectroscopist. But over the house, primal instinct tells him he still has the power of knowledge. So, confronted with a problem in housebuilding, he puts on the armor of his own expertness, hoists himself on Rosinante, and takes the road. Every architect is familiar with this phenomenon. I will wager that were I to provide each of you with paper and pencil you could each in the next quarter hour devise a new wall section which would not look too bad to you, and as we talked here you would be cuddling that fledgling little thought and the warmth of your mind would cause it to grow apace until, from not looking too bad, it would look downright good, and by lunch time it would look like a world beater; this afternoon you would find the back of an envelope and sketch a few other details but not window details, because you don't know how a window works. By nightfall you would have made up your mind to forego the evening's festivities and would be on the long-distance wire trying to bring your patent attorney back from the country; by next week you would have rented a shed; before fall you would have started to build the house; and some time next June we would have another mausoleum in the cemetery of prefabrication. It is just as easy as that.

It is possible to be tolerant of small boys' play. But it is not so easy to be cheerful about the executive of the large corporation who has a vision and sees in housing a market for tonnage. This executive has no difficulty in obtaining a smallish appropriation, and with this in his pocket he sneaks furtively by his own research laboratories, for in them he has found men of candor, and somewhere out in the woods he finds someone who, never having built a house, is inhibition-free. Together they contrive a shelter unit with tons of this or that growing where no ton ever grew before and every ton made by the company, tons wherever it is convenient and perhaps a short ton where it isn't, and often they build this building usually these days, somewhere near Washington where the right people can see it and that is usually the end of that.

But sometimes, unfortunately, the matter goes further and the company invests in dies and inventory and even buys some full-page advertising beginning: "And Now." Later, of course, there is a tough scene at the directors' board on which we may draw a charitable curtain. What prefabrication doesn't like about this is calling something prefabrication research which isn't research at all because the worker is told what the values of *a* and *b* must be and his answer to *c* hasn't a very good probability of being valid. But the greater tragedy is that big corporations have dignity to maintain and word gets around, oh most pontifical word, that the corporation has closely examined the whole subject of prefabrication, which of course it hasn't, and that there is nothing in it. When a lot of corporate gods begin to whisper this way, sometimes the public forms a false conclusion or two as well. How much happier we would all be if only these people would realize that there is gold in the prefabrication hills for every honest maker of an honest building material, that no one material is going to enjoy any monopoly whatsoever when the great day dawns, and that no successful prefabrication will ever be achieved by anyone who has a major motive other than the achievement of prefabrication.

The third big nuisance in prefabrication is the *blagueur*, the businessman, the scientist, or just the fellow who rushes into print, usually by quotation only but sometimes with diagrams, to describe his design for the radically new house of radically new cost and then is heard no more. He never builds the house and as soon as the clipping files begin to fill up again, he loses interest. His wild statements hurt him not at all, but they do hurt the confidence of the public in the honest workers. Fortunately today magazine editors have steeled themselves against this kind of news, and city editors have their bright young men off on the trail of the trailer so there is less space for prefabrication vapors. Maybe there won't be any more prefabrication news. It would be a good thing.

But what of the gallant thin line of serious prefabricators — those serious, sincere, and on the whole well-equipped men of today, those men who now have been in business for several years, who have shown tenacity and courage, most of whose pockets are none too well lined but who, tight-lipped, are continuing to work toward a goal they are sure is there if only they can hold out to reach it. That they have sufficient resources to overcome the difficulties and rise to success is by no means certain, but if they fail it will not have been for lack of an honest try. Nonetheless they have been and still are guilty of some errors. Their major failure is that they have not attained the low costs they seek. In so far as this has been contingent on large-scale production, the reason is clear. There have not been large sales, there has not been large production. This need not concern us. It does concern us whether today's prefabrication is such that it can be readily transferred to large-scale operations when the time comes or whether the present designs must be then so modified that we might as well start all over again. For the most part they would have to be so changed. The prefabricator has not paid enough attention to the strength and the weakness of the machine.

We well know by now what operations are immediately translatable to the machine. Skillful production men may, of course, succeed in performing any operation mechanically. But the road to prefabrication would be smoother and the proof of possible manufacturing costs which would justify expansion would be easier had the designers developed sections which could utilize present well-established manufacturing technology. For example, while precast concretes have always fascinated a large part of the prefabricating world, concrete cannot in the present state of the art be precast with such precision and speed as to result in low factory cost. The scene shifts rapidly and arsenic cements or vacuum processes might change this picture. But the prefabricator has all too often

been guilty of complicating his already involved problem with speculation over some production method still in the embryo or indeed not even conceived.

In the selection of high-cost materials, designers have often been guilty of wishful thinking. Having found normally cheap materials not exactly amenable to their preconceived purposes, instead of altering the purposes to the material they have tried to alter the material to the purposes and at greater cost. The prefabricator must always deal with the prices of today and of a tomorrow which is not over five years long. He has no right to assume, let us say, that his larger use of a synthetic resin will necessarily bring its cost down to that of Douglas fir. The criterion which ought always to be applied in turning to a more expensive material is whether its use will bring other economies. Minimum steel frames cost more than wood frames of adequate properties. However, steel has some characteristics which might be so employed as to produce subsequent savings. Thus its use might be justified. Current uses of steel have, with rare exceptions, not sought to exploit these characteristics and consequently have not been economically justified. Glass bricks, porcelain enamels, some synthetic boards, each good in its place, do not belong in prefabrication because they cost the prefabricator more than the conventional materials the operative builder quietly continues to use, while saving the prefabricator no money at any other point. This way no salvation lies. Almost worse as an example of research thought is that which finds no possibility in any known material and tries at once to develop new ones. If successful prefabrication must wait for some scientist to lay the golden touch on a revolutionary new material, by all means let us cease this discussion and go build bonfires with Dizzy Dean.

In the field, most of the current prefabricators furnish too little of the final product. It is quite understandable that they cannot at once jump to a completely integrated manufacture and perfectly permissible that they act in part as jobbers for shell and equipment. But after they have shipped to the site all they have to ship, the dealer has too much to do. Under his present setup, one of the outstanding prefabricators calls upon his distributor to invest 60% of the selling price himself. It is possible for this distributor-erector to change the profitable price by as much as 15%, depending upon whether or not he can employ his labor full time and eliminate subcontracts. To achieve such a major economy, however, he must employ men by the year, must have a large working capital, must be prepared to build houses for inventory if sales are slow. Imagine a motor industry based on the theory of shipping parts to centers and making local dealers own and operate the assembly plants. Nor is this practice unique: A second leader in the field receives but \$1,200 for every \$5,000 house that goes to a consumer.

Most of this difficulty arises because the prefabricator has not reduced field operations much. I know there have been spectacular accounts of the erection of a house in a single day, but these demonstrations prove almost nothing. What were the costs of that day's work? There lies the rub. Some proposals require derricks or other expensive machinery. Others have designs requiring such precision that, not attained in manufacture, the prefabricator goes to the site armed with driftpins and acetylene torches. Others use elements of too little precision. For example, in some of the first splined houses, the joints crept until on the fourth or closure side the wall dimensions were out nearly one foot. Later this difficulty was corrected but only by a supervisory care in the erection of every unit which is commercially out of the question. One leader supplies his erectors with no formal erection schedule, leaving all to their whim and ingenuity. Almost without exception plumbing and wiring are done just about as in the conventional house, but it is essential for successful prefabrication that prefabricated plumbing stacks, wire chases, and the like be used. It is in the field, a laboratory where no large-scale ex-

periment is necessary to prove a point, that the prefabricator has failed most noticeably. If his field operations are not fast and cheap, he has failed utterly to make his case.

Let us now look at the product from the buyer's point of view. Whatever points he may have missed in shop and field, one would expect the prefabricator to have a good marketable product. It is quite probable he has not known exactly what the public did want nor has there been anyone to tell him. No individual real estate man could speak with confidence and the consensus of real estate thought would be most confusing. Other industries confronted with similar problems have resorted to market analysis. I know of no market analysis for prefabrication.

In equipping the house, the prefabricator began by providing a palace of gadgets. The machinery of the house was awe-inspiring and so was the cost. Recoiling from this recognized error, he now suffers from a tendency to equip below the competition. Ultimately he will come to rest no doubt at dead center, but meanwhile it would seem that he might be giving some study to making modern equipment more efficient from the point of view of installation — for that is his job — rather than trying, as try too often he has, to improve its operating efficiency, which is a job for the equipment manufacturer.

Structurally the prefabricated house has been on the whole sound. Prefabricators as a group have been, if anything, too conscientious in their construction, though there has been the perfectly good reason that the buying public demands they correct every fault, however slight. They have, to be sure, been guilty of spots of ignorance, such as lack of knowledge of the conditions which might cause condensation, but so too have been the orthodox builders and even the manufacturers of insulation. On the whole they have up to now been a group of high integrity, while their methods have often eliminated some of the conventional troubles, such as the effect of wet plaster on prematurely installed wood finish. That the new models can be so highly praised is not so certain. The prefabricator has had desperately to find lower cost and has naturally been subject to temptation on the score of structural quality. All the weeds, moreover, cannot be kept out of the garden. Structural failures of any prefabricated house would be a disaster to all prefabricators, responsible and irresponsible. I feel that I perform a favor to prefabrication when I ask anyone interested in buying a current offering to look carefully at any details which he may doubt. Of the good intentions of most of the prefabricators he need have no doubt.

In looks the prefabricator has again, until recently, missed his mark. He has too long neglected the American sentiment for the Dream House — our one quaint refuge from grim modern reality. There is no doubt that the flat roof lends itself best to the factory plans of the prefabricator. Walter Gropius has, moreover, drawn an utterly convincing picture of its utility and beauty.¹⁵ I can well remember a meeting about two years ago in New York where, after an excellent dinner, most of the leading prefabricators gave their views on style.¹⁶ Among other things they held that their modern style was an asset, not a liability, that the public was coming to want it, that few architects in America were equipped to satisfy the want, that the honest organic prefabricated house would be more popular for its flat roofs and uncompromising battens. Logical as they were, they failed to reckon with sentiment. The retreat from Moscow has now begun; today you can find several, nay most prefabricated houses looking like Cape Cod cottages. As purists we must bemoan the compromise; as students of merchandising we must applaud it; as adherents of prefabrication we must be disturbed to find that it has involved changes which reduce the already slender amount of prefabrication.

Curiously enough, the battened interiors, often with exposed steel beams in the ceilings, do not seem to disturb buyers. Perhaps the American has less interest in interior decora-

tion than he has in presenting a good façade as evidence of his solid respectability. Perhaps these honest interiors may ultimately let the prefabricator lead his buyers back to an honest exterior. When the public is ready for such honesty in architecture, it might be possible to bring to pass the demand by the late Werner Hegemann in his last work:¹⁷ "Whatever their shape may be, architectural ornamentations of residential buildings should become an object of special taxation — at least as long as there are millions of people without the necessary decent shelter. It was Alexander Hamilton who wanted 'cottages inhabited by paupers to be excepted' from his proposed building 'tax'; . . . Hamilton also proposed special assessments for 'every house with pillars or pilasters outside and front,' and for 'every room with stucco cornices' or 'with a stucco ceiling.'" Meanwhile the clapboard rules the prefabricated roost.

Out of all this discouragement we need pluck no thistle of despair but rather a rose of hope. Prefabrication's mistakes are written on sign boards clear enough for the literate to read. Many a charming bypath has already been firmly marked as a dead end. If none of the present prefabricators get to the glade they all seek and if none find there the heady fountain of success, the signs they have left will lead some stronger traveler thither. This much of prophecy I who am suspicious of prophecy will venture.

However it arises, there will some day be a corporation of mental and financial power. Its only goal will be to provide good houses at a profit. Marketing studies will have told it what it needs to offer. Objective studies of materials, manufacturing methods, and the requirements of the building will have yielded a design susceptible of inexpensive repetitive factory production, rapid field erection. Its powers will be such as to let it obtain commodities at the lowest going prices; its integration sufficient so that it supplies all of the house; its experience in advertising and its contact with the best designers will enable it to sell the product easily and cheaply; it will be able, if necessary, to operate a refinancing corporation. At the beginning its plans and elevations will run with the current of public taste, but its power of knowledge and its power of publicity and its power of prestige will soon permit it to mold public taste toward something more logical. It will gladly place its proudest trade-mark on every house it sells and it will never be halfhearted in its endeavor. It will be proud of that trade-mark and so will the owner of the goods. When that day comes, you and I will be able to buy a prefabricated house and will want to buy a prefabricated house and will pay for it perhaps one-half what we would pay for the same shelter unit today. The strong mansion of this corporation will have been built on the rock of research. This is not nonsense.

If the prophecy does not come true in this guise, there is still another ray of hope. There is, as a matter of fact, even now a rather high degree of prefabrication in all the elements of a house except the structure and the finish. Windows, doors, furnaces, all equipment, switches, and so on ad infinitum roll on the mass-production line today. Prefabrication can therefore arrive even without the existence of the Gargantuan corporation I have just described. In this case, however, it must come through coöperation. This is a much harder road to follow to the goal, for a single management can within reason enforce departmental coöperation while the type of integration of which I now speak must be largely voluntary. A recent very able magazine presentation has outlined the mechanism for such an integration.¹⁸ It requires three things: size standards, interchangeability of parts, and multiplicity of function, as for example factory-built closets which would also serve as partitions.

The seeds of each of these have in fact already been sown in the building industry. Modules have awakened more serious interest in the last few years than ever before; people have

come to see the advantage of a uniform standard. A mechanism for modulizing the dimensions of building materials and equipment has already been developed and is even now being suggested to the interested companies. Interchangeable parts are already well developed, though more are needed. Integration of units of equipment has progressed far. We can see, for example, greater integration in steel casements and notably in kitchen, bathroom, and heating units. It is quite true that many an operative builder, though he already uses the integrated furnace unit, still finds it cheaper to build his own cabinet and install his own fixtures than to use the integrated kitchen or bathroom unit now on the market. But this is a phenomenon of transition. The integration of equipment has outrun the integration of the structural shell. The building materials furnished the builder are not of such precision nor do his methods of assembly permit such precision as to let him close with economical accuracy on the precise measurements of the integrated equipment units. In this dilemma he turns back to the building-materials manufacturer for comfort. He prays him to deliver the various integrated-shell methods he knows the materials man has in his laboratory. It is not too much to say that if the makers of building materials and equipment should dare to release to the market all the items which they have already integrated experimentally and should cooperate by teaching the builder how to use them, you and I would scarcely recognize the house-building methods of next spring.

Any such cooperative movement on the scale almost of a crusade is not likely to be self-generating. One cannot blame manufacturers, with distribution methods which they know to be archaic but which do yield favorable balance sheets, for not risking the large losses which might come from failure in trying to alter them. The way of cooperation is arduous but not impossible. It will be easier to attain by the growth of a body with power to force that cooperation and we may all hope that such a body will come from individual and not from communal effort.

One thing must be clear. Such a development is going to require unremitting research — research far more serious than the building industry has yet felt like doing. We need, first, objective study of what our housing minima really are; then, objective consideration of how to build to produce those minima cheaply. Improvement, if any, will come through evolution, not revolution. Suspended houses, houses on stilts, mobile houses, all the phantasmagoria of unrestrained fancy may enliven an evening's discussion; they will not furnish the answer to our riddle. We need hard work and not imaginative excursions into the housing stratosphere.

If we do not soon achieve economy in our house-building methods, the civilization we care for may face ruin. If ever we do achieve this economy, it will be only through conscientious, continued, and far-seeing research in the entire field of the house: its materials, its production, its assembly, its marketing, its use. The institution of which we are jointly proud has in its past produced men whose training would have made them most useful for such study, but their attention has been largely diverted elsewhere. It is now training men able to attack the problem at its roots. It is important that these men, too, be not all diverted to other things. It is encouraging to know that Dr. Compton has already set up a Faculty committee on housing research.

Our scientific institutions ought to begin at once to focus their collective intelligence on one of man's four major problems, one too long neglected by the scientist. Though our Alma Mater and others like her are even now furnishing almost everything needed for the training of men in this neglected field, society demands more. She demands, and in no weak voice, that we furnish not only the men but the aspiration, to the end that science may wield its force where none has yet

been wielded. Society demands a true and sensible answer to its most pressing question. To furnish it is in truth something more than an aspiration; it may go by the very short but noble name, duty.

Footnotes

1. As for example in "Homes for Workers." United States Federal Emergency Administration of Public Works. Housing Division Bulletin Number 3. Government Printing Office, 1937. Notably pages 2, 3, 5, 8, 20, 29, and so on.

2. As particularly well summarized in "Facing the Facts on Housing," (anonymous). *Harper's Magazine*, March, 1937, page 419.

3. There are, of course, other mechanisms of liquidation than a firing squad or exile.

4. "Concealed subsidy" is a rather newly coined term to describe what happens when people living in a community do not pay taxes which cover the cost of the services rendered their shelter by the community. This is very largely the case in urban areas where relatively few taxpayers manage to pay the differential in the cost of water supply, and so on, for all the houses of the poor. The formal subsidies proposed for government would be in addition to these, which may in themselves be quite large.

5. The demand will increase because it is made up of two elements, each of which apparently will increase: (1) Demand created by increases in population. It is true that the rate of increase of our population is diminishing, but the amount of increase is not. Moreover, students of this problem, as for example, Warren S. Thompson in "Population Growth and Housing Demand" in the very valuable housing symposium in the March, 1937, issue of the *Annals of the American Academy of Political and Social Science*, think they detect a trend toward an older population. Rejecting the population under 20 as not being house demanders, they feel that the trend toward increasing age marks also a trend toward increasing demand, even though the population should remain static. (2) Demand created through obsolescence; in other words, demand to replace completely outmoded or outworn housing units. The average age of a house in this country is now upwards of 60 years. This means that on the average we are now replacing the housing built in the decade, 1870 to 1890. Since the great increases in our population and the great increases in our housebuilding occurred in decades subsequent to this, there is reason to expect a vastly increased replacement demand in years to come. Indeed, estimates of the amount of building in the various decades make this increase seem almost certainty.

6. This is based on a favorite computation of mine. We assume a house 28 feet by 28 feet and of one story, divided into four rooms. We give it a flat roof, not to favor the international style but to make the computation simpler. We assume all wall panels to be of wall thickness, story height, and four feet wide; all floor panels to be of floor thickness, 14 feet long and two feet wide. We eliminate all panels which would require windows or doors. This gives us 24 wall and 50 floor panels per building. It is true we have assumed some poetic license, for there might be more than one finish, but this is easily compensated for by the larger houses which would require more panels. The purpose of this computation is not to establish a sober statistical estimate of the number of parts some manufacturer might make, but to show how silly anybody is when he says that 250 units a day would not be big production. Houses are not going to travel down an assembly line like refrigerators.

7. Notably in "The Evolving House," Volume II: The Economics of Shelter, by Albert Farwell Bemis, '93. The Technology Press, 1934. Chapters IV to VIII inclusive.

8. These are rough figures. The hours for all the products except houses are given in "Technology and the American Consumer," published by the Machinery and Allied Products Institute, Chicago, April, 1937. The hours for housing are computed by the writer from data as to wages in the same publication and data as to average house costs in "The Evolving House," Volume II (*vide supra*). The percentage improvements in price alone, eliminating advancing wages, are computed by dividing the hours of 1914 by 192 to reduce the hour-wage factor to that of 1936. Then the 1936 hours, divided by the corrected 1914 hours, give the improvement in price alone. It must be remembered, of course, that this improvement in price alone is in the face of the 92% advance in wages, which was paid by all of the industries cited. Indeed, the only purpose of the conversion, which is not too fair a presentation, is to make it clear that whatever advantage over 1914 the workman now has in purchasing a house is due solely to

advances in the technology of other industries and that in fact he has to sacrifice some of this advantage due to the backward technology of the housing industry. I speak, too, of the "average" house, value: \$3,200; hardly comparable with the bona fide price of a pair of shoes.

9. Better working conditions under a roof, no frostbitten hands, no time out for rain; better and faster tools to work with, increasing output; lower hourly wages, though higher annual wages, reducing unit labor costs due to steady employment which is the usually advanced justification for high wages in the building trades.

10. Better credit; larger-scale purchases; ability to enforce measurement of commodities to specification; chance, due to factory technique and inspection, to reduce factors of safety because he can count on the result he is going to get; chance actually to achieve details of construction that could not be put together in the field.

11. Fewer operations to carry on; integrated parts which go together readily; preplanning of installation of wires and pipes; possibly vertical organization of erection labor with no time lost while waiting for some other trade.

12. Factors similar to those in footnote 10, plus the following: purchasing power great enough to force equipment sellers to make equipment to his specification where that is needed for cheaper installation.

13. For example, certain paints requiring kiln-drying cannot be used in the field but might be used in the plant. Gluing would be possible under proper and controlled pressures, and so on.

14. Outline of Reasons for Past Failures in Prefabrication

(I) Failures inherent in the broad approach

1. Building only a wall, or floor, and so on
2. Designs fundamentally impossible to transfer to a factory
3. Superficial suggestion based on wishful thinking or desire for publicity
4. Prime purpose not achievement of a prefabricated house but obtaining a larger market for specific materials or equipment
5. Prefabricator not a businessman at all, but only a designer, doing no manufacturing himself

(II) Failure through insufficiently low cost

1. In the factory
 - A. Not enough purchasing power, involving
 - a. No low-cost commodities
 - b. No mass production
 - c. No control of production at all
 - B. Inadequate or no engineering study from the factory point of view; designs not suitable to high-speed production
 - C. Use of fundamentally costly materials or processes
2. In the field
 - A. Too little of the building a product of the manufacturer
 - B. Too much field work
 - C. Too great precision of erection required
 - D. Insufficient precision of erection afforded
 - E. No scheduled manner of erection
 - F. Too much equipment required for erection.
 - G. Insufficient or no provision for easy installation of wiring and piping

3. Transport

- A. Failure to use materials that can be delivered to the factory at low freight charges

B. Finish units too large to be shipped and handled economically

4. Excessive marketing costs due to insufficient capital or inexperience

(III) Failure because product nonmarketable

1. Architectural failure

- A. Poor plans
 - a. Plans dictated by apartment thinking
 - b. Plans dictated by ultramodern logic not yet acceptable
 - c. Lack of flexibility to normal family patterns
 - d. Lack of studied equipment
- B. Poor arrangement of equipment
 - a. Under-equipped
 - b. Inadequate provision for installation of piping and wiring
 - c. Over-equipped
- C. No fundamental study of the house as a machine
- D. However attractive by pure esthetics, not keyed to popular taste

2. Structural failure

- A. Dubious use of new materials
- B. Dubious use of flat roof
- C. Dubious flimsiness (*i.e.*, though the thing may really be strong enough, if people can push against it or rap on it or do anything that makes it behave differently than they are accustomed to, they are worried about it.)

3. Financing failure

- A. Due to the thesis of prefabrication, inability to obtain enough percentage loan from permanent financing institutions requiring too much down payment
- B. No corporate possibility of bridging the financing gap
 - a. Insufficient financial power
 - b. Inability to do any marketing until price nearer the final price
 - c. Efforts to apply the fallacious renting thesis

4. Premature ballyhoo

(IV) Failure because of insufficient quality (such as unscientific or unsound use of existing materials — rare)

1. Wood

- A. Dry wood next to moist materials
- B. Green unseasoned wood

2. Steel

- A. So used as to cause condensation

3. Miscellaneous

- A. Insufficient heat insulation
- B. Cold floors
- C. Use of unbalanced units

15. In "The Small House of To-day," *Architectural Forum*, March, 1931, Part I.

16. This dinner was given by *House and Garden* and was covered in the issue for December, 1935.

17. "City Planning, Housing," Volume II: Political Economy and Civic Art, by Werner Hegemann, edited by Ruth Nanda Anshen. Architectural Book Publishing Company, Inc., 1937. Page 376.

18. *Architectural Forum*, April, 1937.

Housing and the Government

What Government Agencies Have Done and Might Do

BY ERNEST J. BOHN

Committee Chairman, Housing and Slum Clearance, City of Cleveland, Ohio

IT IS a signal honor that you have conferred upon me by asking me to participate in the Technology Housing Conference. You have made it possible for me to appear on the same platform with two of my teachers. It was the distinguished Past President of the American Institute of Architects, Robert D. Kohn, who was among the first to point out to me that something can be done to improve housing conditions of the low-income group. His attitude was not that of a reformer or of a Lady Bountiful. Rather, it was the view of the technician who decried the shame of a modern civilization that permitted such disgraceful conditions to exist in the American city when it had the ingenuity to remedy them.

It was Sir Raymond Unwin who gave me the opportunity, while being associated with him as a member of the International Housing Commission, to learn and to be inspired by his philosophy and work. Under his leadership in 1934, we visited over a dozen cities, advising and helping them formulate their housing programs. It was this Commission, sponsored by the National Association of Housing Officials, that is responsible for issuing the report entitled, "A Housing Program for the United States."

If the President of the United States and his advisers and members of the Senate and Congress would only read that report and follow its suggestions, a housing program could be formulated which, when properly administered along the lines suggested in the report, would go a long way to bring about a solution of the problem that we are discussing today.

America, being a country steeped in the traditions of *laissez faire*, likes to leave to private enterprise the doing of most jobs. We have left to private venture the task of providing all our housing facilities, refusing to admit that there is a role that Government must play in this field. This is our traditional attitude in spite of the fact that one of the earliest important acts of our Government was the purchase of the vast Louisiana Territory. It was purchased for the purpose of providing, at Government cost, a homestead to any citizen of the original states who would venture west to find for himself and family a happier life away from the congestion of the eastern seaboard. Our Government was supplying a subsidy for housing in the form of free land. All that the homesteader needed to do was to build his house. This system of homesteading, as we know, was further expanded and became one of the important influences in the development of the American Republic. Many soldiers returning from the Civil War took advantage of this offer of their Government to help them acquire a home. We see then that the present effort of the Government to provide decent housing facilities for our people is not a totally new activity and has a historical and Constitutional precedent.

During the early days of the Republic, when land was free or cheap, when the abundant natural resources of the continent were obtainable by anyone possessing the necessary diligence or cunning, we had no housing problem. If your income wasn't sufficient to furnish you with the necessities of life, or if the facilities that the community offered were not to your liking, all you had to do was to pack up your belongings and your beloved ones and head towards the frontier. In fact, the youth of the Nation was advised, "go west, young man." To bring about a more rapid settling of the west and a more

rapid exploitation of our natural resources, the Government encouraged the construction of transcontinental railroads by giving land on each side of the tracks to the promoters. Railroad companies were formed as much to obtain free land from the Government as to build railroads. The American Government embarked upon what was to become a permanent institution, that is, subsidy to infant industry, subsidy to private enterprise, subsidies to a class which later became the backbone of the opposition to granting of subsidies to worthwhile social enterprises.

The rapid development of the country, coupled with the industrial revolution, brought about a labor shortage. Unhappy European peoples saw in America a haven from their political and economic ills. Millions swarmed to our shores. We offered them jobs but could offer them none of the amenities of life. We crowded them into the tenements of our large cities, shamelessly built for the immigrant workmen without giving any consideration to standards of decency involving light, space or sanitation. Here was the beginning of our housing problem. Speculation in land and overcrowding it with buildings became the rule. Many large estates of today's America were founded in this enterprise. The housing reformers began to decry the shame of the slum. Regulatory laws were passed but due to the ever present shortage, political interference with law-enforcement agencies and the failure of Government to take a direct hand, left the problem unsolved. The shameless activity of the tenement and jerry builder of the eastern seaboard was copied by his cousins in the west. The unplanned, unhealthy, and expensive slum of the middle-west and far west "Middletown" is our heritage.

When we were embroiled in the World War, our industries were speeded up to a maddening pace to produce, we were told, enough to fight a war "that may never end." The families of additional thousands of workmen were crowded into the already overcrowded cities in ship building and munition manufacturing centers. The suffering became so great that the time-honored *laissez-faire* tradition finally broke down and the Government had to step in as it always does in a National emergency. Millions were appropriated for the use of Federal agencies to relieve bad housing conditions of munition workers and ship builders. The labor that produced the war materials had to be decently housed and so the Shipping Board and the War Housing Corporation undertook to provide decent housing facilities for workers at Government expense. Seaside Village in Bridgeport, Conn., and other public housing projects built at this time put to shame any ventures heretofore undertaken by private housing enterprise. A start was made to improve housing conditions although the attack was not primarily aimed at bad housing but merely incidental to the campaign "to make the world safe for democracy."

When the madness of that November evening in 1918, which announced the end of the mass suicide engaged in by all civilized nations, was over, America promptly returned to "normalcy." Oh, yes, we must get the Government out of business. Government housing was all right when there was an emergency, but the workman who was now engaged in beating his sword into a ploughshare was not entitled to decent housing although we were concerned about him while he was

beating his ploughshare into a sword. Congress quickly made provision for the sale of all war housing and put a stop to any further public activity to improve the housing facilities of workers. We were again doing things the American way.

To subsidize housing of the low-income group was not to be tolerated during the ten years of the greatest prosperity that America ever enjoyed, but to subsidize the subdivider, that was a different story. That was normalcy. Let me explain. The subdivider purchased raw land, laid out a subdivision, had his plat recorded, and then asked his local Government to build the roads, streets and sidewalks and install sewers and water lines. The Government issued bonds and pledged the public credit to help finance the undertaking. Everything was fine until the depression came. The "dollar-down-dollar-a-month-pay-for-your-own-home-as-you-would-rent" purchaser lost his job. He next lost his lot or his home and there was no one left to pay the assessments, the entrepreneur having already gotten out from under. The public was left holding the bag and continues to pay off the bonds. That, my friends, is subsidy to private enterprise housing.

The sale of the war housing put a stop to public housing in this country but it did not put an end to our interest in public housing. American capital, which refused to finance the construction of decent housing for its own citizens, grabbed up bonds issued by European municipalities and housing agencies engaged in improving housing conditions of European workmen. What a commentary on the genius of the American investor to point out that in many instances the American capital so invested is gone with the European slums that it has helped to eradicate while our American slums still exist.

It was recognized quite early during the economic depression following our golden era of speculation that a works program might speed up recovery, although we still believed that prosperity was just around the corner. For that reason, Congress created, on President Hoover's recommendation, the Reconstruction Finance Corporation, which was set up for the purpose of "priming the pump" of industry. The law provided that among the types of works that the Reconstruction Finance Corporation could help finance was a program of low-cost housing if undertaken by a regulated company on a self-liquidating basis. Of the hundreds of applications that were filed with the Corporation, only one applicant was successful in obtaining a loan. That was the promoter of Knickerbocker Village in New York City and it was not low-cost housing.

It should be emphasized that the first depression housing activity occurred prior to the New Deal, and therefore the story is not complete without mentioning President Hoover's Conference on Home Building and Home Ownership. Of the eleven-volume report, one, that of the Committee on Large-Scale Operations, merits particular attention. This Committee predicted what was coming. It said "this Committee is firmly of the opinion that private initiative backed by private capital is essential, at the present time, for the successful planning and operation of large-scale projects. Still, if we do not accept this challenge, *the alternative may have to be public housing.*" Unfortunately, the failure of the R.F.C. housing activities did not demonstrate to the Government then in power that the challenge was not accepted and that "the alternative . . . public housing" was then needed.

Well, the pump wasn't primed. The Old Deal went out and a New Deal came in, but unfortunately the New Deal contained very few trump cards for housing. It first set out to save that hallowed but oft cruel American institution, home-ownership. The Home Owners' Loan Corporation was set up to salvage the homes of those citizens who believed that they were home owners only to find that they were merely holders of empty titles and the suckers who paid twice as much for a house as any honest building industry had any right to charge. Loans

were granted to over a million of our people involving an expenditure of about \$3,100,000,000. It refinanced and saved from foreclosure one out of every six owner-occupied mortgaged urban homes in the United States.

The Home Owners' Loan Corporation is one of the four agencies under the supervision of the Federal Home Loan Bank System and is the only one which makes loans direct to home owners. It no longer lends money; its remaining functions are merely to collect payments on outstanding mortgages and to foreclose and liquidate such properties as it must take over on failure of the borrower to make payments as agreed.

The Federal Home Loan Bank System was the first permanent agency established by Congress to provide financial aid to urban home owners. Member institutions can borrow from the 12 Home Loan Banks in much the way that the commercial banks borrow from the Federal Reserve Banks. Prior to the establishment of the Federal Home Loan Bank System, commercial banks which granted only short-term loans were the principal source of credit to home-financing institutions. With the coming of the depression, these short-term credits were called in by the commercial banks, which forced home-financing institutions, in turn, to restrict their loans. It is now possible for home-financing institutions to obtain long-term advances from Federal Home Loan Banks. The System provides for them a reservoir of short-term credit to meet unexpected or short-term needs. The System, which was established in 1932, now has over 3,800 members with combined assets of about \$3,300,000,000. The Federal Government has purchased \$120,000,000 of the capital stock of the System while private member institutions have paid in an additional \$30,000,000. Outstanding advances to these institutions total about \$150,000,000.

The second permanent agency under the Home Loan Bank Board is the Federal Savings and Loan System. This was established in 1933 in order to provide local thrift and home-financing facilities in such sections of the country as had no adequate existing agencies. These associations play somewhat the same role in the field of home financing that the National Banks play in the field of commercial banking. Although the Federal Government sponsors the associations and is authorized by law to participate in their financing by the purchase of shares, they are mutual thrift institutions locally owned and managed. At the present time, there are over twelve hundred associations with assets of nearly nine hundred million dollars, of which the Federal Government has purchased \$133,000,000. Loans were made to over 200,000 borrowers resulting in the financing of nearly 45,000 new homes.

In 1934, Congress created the Federal Savings and Loan Insurance Corporation to insure accounts in savings and loan associations. All Federal associations must insure their shares while building and loan, savings and loan, homestead associations and coöperative banks are eligible to apply for insurance. The accounts of about 1,500,000 investors have been insured in 1,700 associations having resources of about \$1,380,000,000. The Insurance Corporation has a capital stock of \$100,000,000 subscribed by the Home Owners' Loan Corporation.

The Federal Housing Administration was created by the National Housing Act of 1934. It is not a housing agency but rather an agency to aid home financing, administering two distinct forms of credit insurance. The first was created to insure short-term monthly installment notes signed by the owner for the purpose of modernizing homes and other buildings. It was never intended to be more than a temporary recovery measure to create employment and to make possible modernization of homes when the owners had no money with which to do so. The activity of the modernization credit plan ended April 1, 1937 after aiding in the improvement of approximately 1,000,000 one-family houses and 270,000 two-family houses and apartments. As of the first of May of this year a total of

\$560,000,000 of notes were so insured. The plan still has a limited application for homes damaged by floods and other catastrophes.

The second, and more important, function of the Federal Housing Administration is the administration of its mutual mortgage insurance system which, in turn, has two applications, first, to insure mortgages for the financing and construction of one- to four-family houses, and the other, for the financing of the construction of large-scale rental projects. Needless to say, the greater part of its business is in the former field.

In this country, a large proportion of lending institutions were legally unable to make long-term amortized home mortgages or any mortgage for more than 60% of the value of the home. The mutual mortgage insurance system, together with the amendments to National and State banking laws now makes loans up to 80% of the value and up to a period of 20 years but not exceeding \$16,000 in amount, eligible for portfolios of most mortgage-lending institutions of the country. Clearly, the system is designed to encourage home ownership, making it possible for families unable to make a 20% down payment to acquire a home, without the use of costly and hazardous second mortgages. Although careful credit investigations of the potential borrowers are made, it is fair to raise the question whether by making credit too easy, we are truly rendering assistance to a sound housing program. As long as the owner has a job, the easy payment plan works. Only time will tell what the result will be. The Housing Administration should be commended for its campaign against poor planning and shoddy building. Thus far, about 200,000 mortgages in the value of nearly \$800,000,000 have been accepted as eligible for insurance.

In support of the Federal Housing Administration's contention that they are helping the low-income group, these figures are cited. Of the owner-occupants of the homes insured, 50% had an annual income of \$2,500 and less; 32% had incomes of \$2,000 and less; and 18% had incomes of \$1,500 and less.

Under Section 207 of the Act, the Federal Housing Administration may insure mortgages on large-scale rental housing projects. Three developments have already been built and seven more are under construction.

Title III of the Act sets up the machinery for the creation of National Mortgage Associations and regulations have been issued by the Administrator. Although several applications have been received, no association has yet been set up. It is obvious that some of the agencies and activities of the Home Loan Bank System and those of the Federal Housing Administration are duplications of effort.

The Public Works Administration was created by the first Emergency Relief Act and continued in existence by subsequent legislation. This agency was authorized to undertake a program of public works to relieve unemployment. Low-cost housing and slum clearance was mentioned in the measure as one type of Public Works eligible for assistance. The bills provided further that in order to bring about employment more rapidly, the Administrator could make a 30% and later a 45% capital grant of the cost of construction. This is all the law that Congress had enacted which authorized the Federal Government to undertake a subsidized housing program.

The Housing Division of the Public Works Administration developed a nation-wide program of low-rent housing and slum clearance in 36 cities of the United States. Of the total 51 projects so developed, 27 are slum clearance undertakings and 24 are on vacant land. The slum clearance program razed nearly 6,000 dilapidated buildings containing over 11,000 units, dehousing about 9,000 families. Due to a shortage in most communities, many persons so dehousing had to take up their abode in facilities as bad, or worse, than those from which they were evicted. However, many of them are eligible for admission to the new projects when completed.

The aggregate final allotment given to the Housing Division of the Public Works Administration was about \$134,000,000. The facilities constructed with this money will provide decent, well-planned, sanitary homes for families of \$1,785 wage earners. To date, five projects are occupied, including those in Atlanta, Miami, Atlantic City and Montgomery. The shelter rent ranges from \$3.97 per room per month in Atlantic City to \$5.52 in Atlanta. The income of the tenants in the developments ranges from \$765 per year in Montgomery to \$1,107 per year in Atlanta.

The officials of the Housing Division have announced a program of decentralization, that is to say, as soon as projects are completed, they were to be leased to local Housing Authorities. Since making this announcement, however, and agreeing to lease the Harlem project to the New York Housing Authority, the policy of the Housing Division has again been changed. Projects will not be leased to local Authorities until after all the operating personnel has been selected and the tenants have moved into the projects under Federal management.

This practice on the part of the Housing Division of continuous changes in policy has subjected that agency to a great deal of criticism. When it was first organized, loans were offered to limited dividend companies who were urged to prepare plans and submit them to Washington. Of the hundreds of applications so submitted, only seven were approved. These seven are all completed and occupied. The rentals range from \$3.73 per room per month for shelter in Virginia, to \$11.00 per room per month, including all utilities, in New York.

The policy of helping limited dividend companies came to a sudden end when the Housing Division announced its intention to do subsidized housing and the word was sent out that State laws will have to be enacted which would permit the carrying out of the program. Many local Housing Authorities created by laws inspired by the Housing Division filed their applications, only to be advised that there was another change in policy. Instead of loans and grants to local Housing Authorities, the Public Works Administration decided to undertake the construction of all projects themselves even to the point, in some cases, of selecting the sites. If there ever was a demonstration of housing by trial and error, it was that undertaken by the Public Works Administration.

Now that all the projects are either completed or under construction and a comparison can be made with what private enterprise has done in this country and with what both private and public agencies have done in Europe, even the severest critic must admit that, all in all, the projects are pretty fine demonstrations of well-planned and decent housing facilities. The severest criticism that can be leveled against the projects is that they cost too much and that the standard of both design and construction was too high. The result is that the sponsoring groups in the local communities are now engaged in defending attacks on the program on the ground that persons who are housed in the projects are not of so low an income group as it was planned would be accommodated therein.

Some attack was also made upon problems of rural housing. In the earliest days of the New Deal, the Subsistence Homestead Division was created in the Department of the Interior. With the \$25,000,000 allocated to it, a series of subsistence homesteads were constructed. They were planned and built for so-called stranded populations, persons who could no longer make a livelihood in their former occupations. A house with a plot of land was made available for them. The plan was for the tenant to augment his income with the crops that he raised on these small parcels. The Emergency Relief Administration also developed a few projects of this character. The communities so developed by both these agencies were subsequently taken over by the most recently created housing agency, the Resettlement Administration.

The Resettlement Administration undertook to complete the projects already started and to administer those that were completed, in addition to carrying out its own program of providing housing for low-income or destitute families. It was also engaged in other related activities concerning proper land use, rehabilitation of rural families and farm debt adjustment. Much of what was inherited from the two agencies referred to before was abandoned. Many of the communities intended to house the stranded populations were discovered to be themselves stranded communities. Many were constructed too far away from a place of employment and therefore the settlers in the new communities had no income other than that they received as salary from a public works undertaking and the value of what few vegetables they could raise on their ground. The Resettlement Administration proceeded to induce owners of industries to construct plants in or near these communities. Cooperatives of all sorts were also encouraged.

From the housing point of view, however, the most significant activities of the Resettlement Administration are the three green-belt communities that were constructed. They are located near Cincinnati, Milwaukee and Washington. Locations were chosen for their proximity to industry and occupation because of the greater stability this promises the residents. They were equipped with all community facilities, that is, stores, theaters, community buildings, and so on, thus being complete towns in themselves.

At the present time, the Resettlement Administration has 94 active rural projects located in 36 states; 29 of them providing homes for 1,316 families are completed and 65 projects providing homes for about 8,000 families are under construction. Ten of the 65 projects now under construction have been initiated as demonstration farm tenant security projects providing homes for approximately 1,000 tenant families. On the 15th of April, there were 3,139 families reported in occupancy in homes of Resettlement projects.

Another part of the Resettlement Administration's activity is known as rehabilitation-in-place program, whereby farm families are enabled to get their present farms back on a paying basis. Rehabilitation loans were made to more than 305,000 families amounting to more than \$127,000,000 of which \$22,000,000 has been repaid. In addition 430,000 farm families have been carried through emergencies such as drought, flood, tornado, and so on, by subsistence grants.

Unlike the Public Works Administration which carried on its program by contract, the Resettlement Administration undertook its job by force account. Relief labor was used and, of course, that makes it almost impossible to compute the cost. A great deal of land was also acquired for use as a green-belt, the cost of which is not properly computed as part of the cost of the living units for rent-computing purposes. Since Administrator Tugwell's resignation, Resettlement has been merged with the Department of Agriculture.

Here is another case of two actual housing agencies doing similar work, that is, constructing subsidized housing. Not only these, but all the other agencies set up by law or executive order, are jealous of their prerogatives. Each organization thought the other was a competitor and in many cases engaged in undermining the activities of the other. It was not an uncommon thing to read the headlines in a not too friendly press that the heads of two housing agencies were calling each other names. It was obvious that no real program could be developed unless an end was put to this bickering.

The friends of housing were indeed happy to hear that the President of the United States decided that the activities of his multitudinous housing agencies must be coordinated and that he appointed his respected and conscientious uncle, Frederic Delano, Chairman of a committee to bring about some order out of chaos. Hardly had the new Central Housing Committee begun its deliberations when the country was star-

tled to hear that another coordinating agency was created, this time in the Treasury Department, headed by no less a person than the former head of the Real-Estate Board of the largest city in the United States — to advise on public housing.

The Central Housing Committee, as a coordinating agency, has little or nothing to show for its existence. It was doomed to failure from the very beginning. It was an attempt to coordinate the cat and the canary. The meetings of the Committee were evidenced by bickering, ill-feeling, and intrigue. Agencies were dealing with each other at arm's length and continually jockeying for position. Instead of helping to formulate necessary legislation to bring about a well-rounded housing program, the Committee was used to stymie the passage of legislation. All the energy expended in this agency, however, was not altogether wasted. One important by-product of the effort was the work of several committees which dealt with such matters as research, appraisal and standards. These committees made a conscientious effort to marshal resources of each agency for the purpose of suggesting an answer to more or less technical housing questions.

It would be easy indeed to draw a bill of particulars showing why our housing program has not been a success. Of course, there were a great many mistakes of judgment in carrying out the program. There was certainly enough money made available in the early days of the depression, to do something really significant. It should however be borne in mind that the program was a new one for the United States; that the type of our public administration has never been one of the things that America could be proud of; and that there were practically no laws on the statute books unconnected with the relief problem that would guide the administrator of a housing program. The housing activities of the Government were not undertaken primarily to improve housing conditions but rather as a step in the recovery program. The problem we face now is to take advantage of what we have learned during this period of experiment by trial and error.

As general economic conditions improved, families again undoubled and the marriage rate increased. Although many businesses had a partial recovery, the construction industry did not. In spite of all the talk of a housing program, few houses were built by either private or public enterprise. The need for additional facilities and the failure to provide new ones have brought this country to the brink of the severest housing shortage in its history.

To remedy this situation and to put into action the talk and sentiment for improving housing conditions, the Wagner-Ellenbogen Bill was introduced last year. The several public housing agencies, municipal governments, housing reform organizations, the building trades, as well as some religious organizations and others, supported the measure. It was soon discovered, however, that many important persons, who were in favor of improving housing conditions, lost their interest when asked to support a specific program although it was only in its legislative stage. It should be remembered that this was in the "must" legislation days. When the President of the United States wanted a bill to be passed, he advised Congress that it "must" be enacted. President Roosevelt, from the days that he was Governor of the State of New York, through the period when he was Honorary Chairman of the American Construction Council, and through all the days of the fire-side chats, always spoke in favor of improved housing conditions and let it be said for him that he has done more about it than any previous President. Nevertheless, the Wagner-Ellenbogen Bill was not put on his "must" list. Due to the almost Herculean effort of the friends of the bill, it was finally passed by the Senate. The House Committee, having consistently refused to consider the measure throughout the whole of the session, was unable to report it out in time for consideration by the House prior to adjournment. There was some evidence

during the closing days of the session that high Administration officials did try to force action by the House Committee but it was too late.

There are some persons who are unkind enough to say that the bill was not passed because good housing makes good campaign talk. Had the bill been passed, improved housing conditions for the poor could not have been used as a bid for votes during the coming election. You will have to decide for yourself whether that charge is justified.

All hope for the passage of the bill having been abandoned, the Federal agencies were faced with operating subsidized housing without any legislative guidance. I have pointed out before that there was little legislative authorization for embarking upon a subsidized housing program. The George-Healey and Black-Bankhead Bills were quickly drafted. They authorized the operation by the Federal Government of the Public Works and the Resettlement projects, authorized the payment of service charges in lieu of taxes, set forth the maximum of interest that tenants could be called upon to pay, provided for standards of eligibility for tenancy, and made other like provisions. The Committee was so concerned about the harm that could come to private enterprise from a public housing program that they inserted in the bill the provision that all families whose income was more than five times the rent should be barred from tenancy. The result is that families with several children, who need the help more than those with no or few children, are automatically barred from living in the public housing projects. Unfortunately, incomes of families do not increase in the same proportion as the number of children and the number of rooms that are therefore needed. In a project that I have in mind, after fixing the rents based on a certain interest rate, it was found that the group needing the housing most could not be accommodated because the rents were too high. The rents were recomputed, based upon a lower interest rate. The reduced rentals again barred this group because the new rents were slightly less than one-fifth of the family income. It seems to me that the test of who shall be permitted to occupy subsidized housing facilities should be a matter of administration. Anyone who cannot, with his income, purchase or rent decent housing facilities made available by private enterprise should be eligible to live in the subsidized dwellings.

Well, the 1936 presidential campaign came along and again everybody was talking housing. The subject became a great non-partisan or bi-partisan issue. The Democratic National platform had this to say:

We maintain that our people are entitled to decent, adequate housing at a price which they can afford. In the last three years, the Federal Government, having saved more than two million homes from foreclosure, has taken the first steps in our history to provide decent housing for people of meager incomes. . . .

We believe every encouragement should be given to the building of new homes by private enterprise and the Government should steadily extend its housing program toward the goal of adequate housing for those forced through economic necessity to live in unhealthy and slum conditions.

Not to be outdone, the Republican Party of the State of New York inserted the following housing plank in its platform:

We recognize the need for slum clearance initiated and executed by State and local Authorities. Within the limits of a sound State financial policy, we favor public aid to provide homes for families now living in slum areas and unable otherwise to afford decent, safe and sanitary housing.

On more than one occasion in his campaign for re-election, Candidate Roosevelt spoke of the disgrace of the slum. In his very last speech before election, he pledged his Administration to remake America. No longer could we tolerate "one-third of a Nation ill-nourished, ill-clad and ill-housed."

Early this year, Senator Wagner of New York, that most fervent and loyal champion of social reform, again took up the cudgels of public housing. He reintroduced in the Senate a much improved Wagner Housing Bill. Chairman Steagall, of the Committee on Banking and Currency, introduced it in the House. Senator Wagner had the right to presume that Administration support would be immediately forthcoming. As a matter of fact, many interests who opposed last year's bill were reconciled to the fact that this year's measure would pass with strong Administration backing. Months have elapsed since the bill was introduced and at this moment it has not even been reported out by the Senate or House Committees. The opposition has gained heart and a lively campaign is now going on to undermine the bill. To paraphrase the words of a famous American, it can truly be said that in official Washington "we have millions (of words) for housing but not one cent for its financing."

Last year, the President was told by his advisers that no housing program could be developed because not even the friends of housing were united on a program. The trick worked. The bill was buried under an avalanche of reports of his housing coördinators and committees. This year the opponents of the measure can no longer say that housing people differ on the solution because the bill has been redrafted taking into consideration all divergent points of view. This year, it is a campaign of misrepresentation. Word has been sent out that the financial provisions are unsound; that the cost would be so staggering that it would bankrupt the country; and that if the program were undertaken, recovery of private business would stop.

The people of the United States have a right to take their leader, the President, at his word. He has promised them housing legislation and a housing program. To be true to himself and true to his trust he should repudiate those advisers who are trying to sabotage his program.

President Roosevelt and his New Deal are permitting themselves to be put into an untenable position. Only a short time ago, former President Herbert Hoover, that leading exponent of the individualist and laissez-faire doctrine, came out unequivocally for subsidized housing for the low-income group. Only a week ago, one of the Republican leaders in the House of Representatives, Congressman Dirksen of Illinois, in a speech made on the floor of Congress, said:

Year after year, we have been content to apply a poultice to the canker of unemployment and relief instead of courageously plunging the scalpel into it. And the longer we temporize the more difficult it will become to insure national relief from relief. Had we come to grips with this whole problem of housing, instead of blithely contending how many dollars would be necessary for relief in each of the last three years, we might have been able to boast of some definite progress in solving unemployment and its twin sister, relief. . . .

If, as the President has said over and over, one-third of our people are ill-housed, is it not high time that we do something about it besides confess this national shame. Yet no aggressive effort has been made to produce housing legislation. *A housing bill goes just so far and then dies an ignominious and untimely death.* . . .

The shadow of adjournment is already upon us, and day by day it becomes apparent that once more we shall go home without doing something definite and constructive about the housing problem. Next winter we shall return to resume our labors and doubtless appropriate more funds for relief without having gotten at the cause of relief.

The Wagner Bill is sound housing legislation which takes into consideration not only the experience of European countries and our own gained during the past four years, but sets up machinery that is truly American and is based upon the suggestions of the best thinkers on the subject. It sets up a permanent Federal agency to make loans and grants to Local Public Housing Authorities which desire to undertake a low-cost housing and/or slum-clearance program in their respective communities. The bill sets up adequate standards to

which local agencies must conform so as to insure the carrying out of the intent of Congress. The loans are made from the sale of the Federal Agency's bonds which are guaranteed by the U. S. Government. The Federal agency takes back the bonds of the local Authorities, the security for which are the buildings to be constructed and which are income-producing. The United States Government has never loaned money with better security and assurance of repayment than that made possible under this bill.

In order to make the facilities available to the low-income group, it is provided that Congress appropriate annually, over a period of years, a sum of money to be used as a subsidy to make up the difference between the economic rent that would have to be charged and the rent which the tenant can pay. The superiority of the annual subsidy over the capital grant is recognized by all who know anything about the subject. The bill provides that the Federal Authority give preference in making loans and grants to those communities which are willing to make local contributions of one sort or another to reduce the rent, be it land, tax exemption, services, or money appropriations. There is also a provision in the bill which authorizes the Federal agency to undertake a limited number of so-called demonstration projects in communities where local housing agencies do not exist but where there is need for housing. The Federal agency may also make loans, but not subsidies, to certain kinds of regulated limited-profit agencies. The purpose of the bill is to solve the housing problem primarily and not the unemployment or relief problems.

The future of public housing in this country is wrapped up in the Wagner-Steagall Housing Bill. Unfortunately, man gives less consideration to the suffering of his brother when he, himself, is well off. As general economic conditions improve, the plea for improving the housing conditions of the less fortunate members of the community falls on less sympathetic ears than when all of the community is suffering as it did during the height of the depression. I hesitate to predict how long it will take to arouse again the interest in housing that now exists if this measure should fail during the present Congress.

The bill recognizes the fact that there is duplication of effort in the present housing setup of the Federal Government and for that reason provides that the President, by executive order, may transfer the activities and assets of any existing housing agencies to the newly created Federal Authority. The experience of the past has shown that what is needed is not a coordinating agency but a clear demarcation between the functions of agencies that are strictly housing agencies such as the Public Works and the Resettlement Administration on one hand and home-financing agencies such as the Home Loan Bank Board System and the Federal Housing Administration on the other hand. Very definite recognition should be given to the need for both these two kinds of agencies. However, not more than one Federal agency should exist which does housing and not more than one should exist which is in the field of home-financing.

A third important Federal function in the housing field is that of research. The work of the Bureau of Standards in the Department of Commerce should be expanded. That agency, or some other agency that might be set up, merits adequate financing. It should be charged with investigation and research in the fields of construction methods, materials, standards, land, labor, management and administrative problems with a view of ultimately suggesting a reorganization of the construction industry that would bring order out of chaos and would benefit not only the consumer but the tax-payer, the workman, the contractor and every other group in the housing field.

Tomorrow's housing program must provide for a clear demarcation between the sphere of National Government and that of local Governments. More than half the States have already enacted legislation authorizing local communities to undertake the solution of the housing problem as a Governmental activity. Many of these laws require revision in light of our experience and in light of possible legislation by Congress. The States that have not yet enacted this needed legislation should be urged to do so immediately.

The housing problem is a National problem. There is ample evidence of this fact. I have no doubt that when the constitutionality of Federal legislation ultimately reaches the Supreme Court, that Court will find that national funds are being legally expended. The housing problem, however, will never be solved unless the local Government helps finance the program. The local contributions may be in one or in several forms as suggested in the Wagner Bill. The Federal legislation, however, must be so drawn that it will permit the solution of segments of the National problem in communities which, for one reason or another, are unable to make a contribution toward the financing of the program. No hard and fast rules requiring local contribution should be included in the bill.

There should be no difficulty in the future with private enterprise. Even the most rabid public housing advocate does not recommend that all housing be undertaken as a public venture. Government should concern itself with the financing of only that part of the problem which private enterprise is unable to solve. If the public housing program is properly administered, there will be no competition with private enterprise which furnishes decent and sanitary housing facilities. Public enterprise should house only those who are unable to pay the economic rent that private enterprise must have under a profit system. Private enterprise, on the other hand, must be made to realize that it must forego being in the business of renting substandard housing facilities in the same way that private enterprise no longer offers for sale bad milk and bad meat.

I should like to make additional suggestions for the development of the long-term housing program of the future, such as the use of Social Security funds to finance public housing, but my allotted time is drawing to an end. Before closing, however, I wish to express one additional thought and that pertains to the place of politics in a public housing program. Just as soon as Government takes over an activity that has heretofore been considered as belonging to private enterprise, the matter becomes a political question. The question of whether money should be expended and the amount to be so used by Government is a matter that must be honestly discussed on the political platform by friend and foe alike. Public business must be transacted in the open. In a democracy, politics is the connecting link between the people and their Government. There can be no other way. I have no more right to tell you there must be a housing program than you have a right to tell me that there can be none unless you contend that dictatorship is based on right, and that, I, for one, will not admit.

I close by quoting a sentence or two from the "Housing Program for the United States" to which I referred before — it sets forth the basis for public intervention in the housing field:

The health of any community and its social and economic stability require the maintenance of a certain minimum standard of housing accommodation for its families

The duty of securing the *standard* must be regarded as a public responsibility, and, as in the case of education and water supply, must be undertaken as a public service.

The Future of Housing

Some Possible Ways Leading to Better Shelter

BY ROBERT D. KOHN

Chairman of Committee on Theme, Board of Design, New York World's Fair, 1939

NO one will doubt that we have to face in our own way the problem of housing in America, with regard to both governmental and private activity in this field. Unquestionably the experience of other countries can be studied to great advantage if we expect to make an intelligent attack on our own vast difficulties. We realize, with considerable shame, that our constructive interest in low-cost housing is years and years behind England, Sweden, and Germany. The interesting experiences which these countries have had can help us in our own first hesitating steps if we interpret them intelligently. But when all is said and done, while we start with that advantage, we must go on our own just the same.

The reasons are obvious. In every area of the United States, urban and rural, we have to deal with a mixed population, possessing an enormous variety of traditions, racial antecedents, economic contrasts, and family patterns. We have in different areas a unique variety of climates, from arctic to subtropical, and these sometimes alternating in the same place. We have a rich variety of materials and methods of construction, old and new, such as no other country has been blessed with. We are naturally nomads. In the nature of things our workers pull up stakes on the slightest economic inducement or no inducement at all. This foot-looseness also affects our white-collar workers and the middle-class luxury group of citizens — that considerable number which is on the verge of not having to work unless it wants to. This shifting tendency is so commonly recognized that it has been suggested that our housing problem is going to be solved by the universal use of trailers!

There are still other characteristics possessed by our people which will either help or hinder us in housing reform. We have, to begin with, the tradition of individual initiative (a relic of the winning-of-the-frontier years), a willingness to jump in and "do something about it." On the debit side, we acknowledge long years of unthinking speculation in land and buildings — of shoestring investments, of catchpenny attitudes based in various degrees on rationalizations of real impulses or mere self-interest. "Own your own home." — "Home ownership prevents radicalism." — "The government never does anything well." — "Keep the government out of business." All of these attitudes and many others may be expected to help, to twist, or to obstruct our attack on the great problem which faces us.

It seems to me that in the way we have built our cities, we have the most notable illustration of the total failure of unguided, uncontrolled, individual initiative in the United States. So called *laissez faire* has shown itself at its worst in this field in the last 50 years. We cannot bear to see poor people suffer for lack of medical attention, so hospitalization is taken over more or less as a public obligation. We believe that American citizens should be literate, so free public education is provided. Besides, there isn't much money to be made out of these services. But land speculation and housebuilding are exciting and profitable businesses in a rapidly growing country. Their leftovers — wretched hovels, blighted districts, and bankrupt cities — do not immediately come into full view, any more than do our millions of acres of worn-out,

deforested lands. So years ago only a few crackpots talked of doing something to arrest these movements. With us, constructive housing legislation is hardly more than ten years old. In the United States, practically all so-called housing laws previous to 1917 were *restrictive*. In other words, tenement-house or residential laws of one kind or another only prescribed quite inadequate standards of what might or might not be done by private investors in the way of light, air, sanitation, and fire safety.

In considering what are to be our ways towards better housing, I must start (even if somewhat outside the topic assigned to me), by quoting Frederic A. Delano, wise counsellor to every worthy movement for broad-gauge planning. In *American City*, his conclusions on what should be our housing policy were published: "... the Federal Government, in addition to its program of technical and economic research and indirect assistance to mortgage financing, should assist local governments by grants and loans to carry out a housing program for the benefit of low-income families. The grants recommended were divided into two kinds: those designed to encourage municipal acquisition of land, whether in blighted areas and slums or in outlying sections, and those applied as well to the cost of construction. The latter, Mr. Delano recommended, should be strictly an emergency and temporary activity, to be discontinued when local governments should become financially able to carry their part of the responsibility. The former should be used, under Federal supervision and in conformity with local needs, either to correct the past mistakes of urban residential growth or to provide land reserves for long term lease to encourage proper residential development for low-income families, whether built by municipalities, coöperatives, or private enterprise. In all cases, it was recommended, strict city planning and zoning measures should protect low-income neighborhoods from undesirable developments, and should reduce fictitious land values by making it clear that such neighborhoods should not be used for industrial or commercial purposes."

In view of our past record as a people and the present situation, it seems to me important that we face the subject as American citizens have prided themselves on facing American problems, namely, by taking the initiative ourselves. For the moment let us forget all the important details and consider what lies ahead of us as a general thing. As an ordinary citizen, materials and methods of construction do not interest me. Others are more competent than I on this part of the subject. My interest should be primarily to awaken my fellow citizens to the economic and political importance of a better living standard for the great mass of the people. Others can be working on the details of construction, production, and financing of housing. To accent these in any general campaign would be to risk losing the essentials in a vast area of debatable technique. So also, we will forget for the time being the contentions of those who believe that the solution lies in some new form of taxation, or in glass, steel, and concrete goldfish bowls, Maypole houses, machines for living, and all the rest of the endless single-idea patent medicines. For the time being we will also ignore those who dodge everything by charging that as the world's economic system is dead wrong, there is consequently

nothing to be done about housing or anything else until we start all over again. About each of these, we can fairly maintain that after all it presents only a partial aspect, and that taken all together they make an incomplete and inconsistent mass of irreconcilables which do not touch public opinion in a vital way.

The future of housing in America depends on our individual recognition of the essential character of decent shelter for all citizens, as people a century ago considered providing free public education for all citizens. The parallel is by no means perfect, for of course no one has ever gone so far as to propose free public housing (except for public charges in old peoples' homes, the hospitals, and the prisons). About a hundred years ago, people were objecting to the establishment of free public schools on the ground that such education at the expense of the taxpayer would be pauperizing the citizens who benefited from it and penalizing the thrifty. A reading of the debates on this subject in the New York Legislature in the Thirties of the last century will show a startling parallel to our situation today when a majority of our good citizens still question the sanity of those who propose that we should build shelter for people who cannot pay a rent which would return a profit to the builder.

If we had been alive in 1830 and really progressive in our thinking, we would have realized the import of free public education on the future of our country. We would have considered the extent and quality of education essential to the development of a democratic community. We would have studied the possibilities of an educational system varied to suit rural and urban life: how far we ought to go with it; whether private schools or government schools should supply higher education; whether the kind of education to be furnished was to be guided by a progressive view of the needs of its beneficiaries or by some historic precedent. In other words, we would have considered the relation of education to the citizen in terms of all the other elements of the problem of building a democratic community life, particularly in view of the devastating effect which a continued general illiteracy would have on the exercise of manhood suffrage.

Now with regard to housing, with foresight and a conviction of political necessity equal to that which we would have had (I hope) a century ago on public education, we must ask ourselves what effect continued bad housing for a majority of our population has on us — not on somebody else, but on *us* — particularly if we ourselves are not physically its victims. We must realize what it does to our cities and country as a whole; not only the too obvious bad and costly government, misery, and crime it produces, but the more important block which it is to our national progress, crushing out latent potentialities in all kinds of people. We would look ahead, cast historic precedent aside, leave to private initiative what it can do well (under some general overarching control plan), yet we would have the courage to undertake everything else by local cooperative effort, sustained, guided, and subsidized by government, so that eventually the opportunity for at least the envelope of decent living would be denied to no one.

You will see that in this attempt at drawing a parallel to the attack on education as it might have been made a century ago, I have deliberately avoided practical considerations known to many of us but yet painfully to be impressed presently on the hardheaded taxpayer, namely (what you all know), that the blighted sections of every community not only do not bear their share of the cost of city operations but impose a great extra load on the owners of the comfortable places where you and I live. If our fellow citizens are not touched by the human misery involved, they are surely going to be moved in the long run by the distress in their "pocket nerves." I need not stress the fact that most of our larger cities, if they are considered as going corporations, are bank-

rupt today, with potential sales (tax incomes) based on false prospects of growth and very definite and inescapable costs of operation. The American city has been expanding like some businesses with larger and larger capitalization on which a return must be earned in order to keep going. Only our cities differ from business corporations with a growing capital and operations cost, in that we give away to the land and building speculators all the potential profits of the transactions of growth and leave the cities operating an obsolescent plant with a decreasing income. But here again I have touched on a collateral issue which is outside my field.

I am not appealing for progressive thinking on necessary next steps to those who directly suffer from the occupancy of bad housing. I am saying that the situation seriously affects the great mass of people who are *not* living in such houses. It will be their job to understand the problem and to find ways and means of joining with others in each community for co-ordinated action. We have to expand our idea of a democratic society-in-the-making which we thought was on its way but which is more menaced by the mess we have made in building cities than by many thousands of new judges sitting on an unimaginable Supreme Court. So as at other historical, critical moments, we are being diverted on our road toward a better civilization by a question of whether there should be nine spokes in one of the wheels of the democratic chariot, or 15. What's in the wagon and where it is going is the real question. As I see it, the advancing welfare of *all* the people is involved in both. The challenge to our democracy which our miserable housing presents is to me the critical point today and we must take the initiative in every community to do away with those conditions of living which make impossible the fulfillment of the democratic ideal itself. For this same reason our predecessors agreed that they could not risk the ballot in the hands of those who could not read and write and know enough to find out for themselves the merits of any question at issue. So the basic subjects of a general education were to be made available to (even forced on) each future citizen, else he could never make his distinctive contribution for the common good of the community. Obviously, providing a minimum standard of decent living accommodations for everyone is more complicated. Education, inadequate as it still is in many respects in many communities, has no left-overs so corrosive of human relations as the houses in blighted areas of our cities. Free public education was not introduced for the reason that most private education for the poor was bad, but because education was only for the wealthy. Our problem of decent shelter for everyone is more comparable and allied to that of providing adequate food and clothing for everyone in a world which could produce sufficient for all but does not know how to do it. It is a part of the larger problem of organized planning to produce for human needs, as against the historic system under which we all suffer — the hit-or-miss system. The challenge, as I see it, lies in the fact that this great overarching problem cannot be solved by a cry against someone else, either against organized capital or organized labor, or against the speculator. We are all involved. We are going to extricate ourselves by a joint effort. We will do this as we begin to understand our present-day dependence for individual welfare (and more important still the welfare of our nation) on the welfare of everyone else within that nation. It can be acted on effectively, however, only by the people themselves through and with their government.

You and I, not as technicians, but as citizens of a community, will see to it that we do our share toward understanding the elements of this great problem which our democracy must face, and not alone in terms of our own comfort. Constructively we will plan our efforts to coördinate them with those skills other than our own which make up the total of functions essential to the general welfare in each region. It is

the piecemeal, the self-regarding nature of our separate efforts which defeats the ends of democracy. The answer to our greatest failure, housing, will not be found in a patronizing charity but in a new insight into what our democracy set itself to do but has not yet worked out anywhere. I dare to predict that in properly studied, large-scale rebuilding of our communities related to long-range planning and worked out by local, semipublic agencies under governmental guidance, we will find our first opportunity since our 18th-Century town-meeting days to advance the idea of a community of interests with all its concomitants of experiments in education, in the arts, in recreation, and in coöperation. We have lost sight of many of our great democratic objectives. We will be in touch with them again in this effort we are going to make jointly to rebuild our communities on a relationship of coöperation, which can only be effectuated by free human beings of all classes living coöperatively with each other in decent human surroundings.

Of all the possible ways to better housing, I see the first step to be the realization of how far wrong we have all gone. We are beginning, but there is still much to be done toward the spread of an enlightened public opinion on the subject. We will start to take account, at their relative values, of all the elements with which we have to deal, remembering that good and bad are sadly connected with every one of them. For instance, we recognize the impulse in people to want to control a piece of land, each for himself. Back of "own your own home" is a real, ingrained passion, born in us. Somehow we must satisfy this passion without playing into the hands of the speculator or alienating the land from control for future use. Perhaps long-

term tenure will be the way out. So in the matter of the value of individual initiative. It has served us badly in the matter of housing, but it could be canalized into good ways and certainly no one would wish to lose it by bringing all housing under crystallized cast-iron government initiative and control. Far from it. There never was an opportunity open to us as a people where we needed more completely to bring all people into the works. We must convince people that better planned and placed and managed housing is not just another charity. It is no such thing. A guarantee against smallpox is no charity. The isolations possible to each group in our present-day American communities have concealed from us that we have been drifting for a century into political and economic isolations which make a farce of our efforts to attain even a semblance of democratic form and substance. The people must live a democracy, not mouth it. They will begin to live it when we begin to build into our new community housing the form and substance of community life.

The hope I see, then, is that we are on our way. Let us use all the technique anyone can develop, get at all the knowledge anyone has. This is a job of nation building, not housebuilding, and we are going to do it as citizens, for ourselves. We will organize the disinterested forces in every community; we will show the others that they cannot afford not to come along; we will relate our groups to the groups of the region and the state. The part that government is to play can easily be defined, but the locality must lead the way and must make its share of (apparent) sacrifice to develop a long-range program of rebuilding our hopes for the nation by means of the tools which the better community living of its people will put in its hands.

By Way of Summary and Emphasis

The Scientific Approach to Our Housing Problem

BY VANNEVAR BUSH

Vice-president and Dean of Engineering, M.I.T.

IT is the function of your presiding officer to summarize and emphasize. In approaching this task, I remind you that I am in no sense an expert on housing. This is, however, essentially a scientific problem, including both the social and the physical sciences, and all scientific problems have much in common. Moreover, it seems to me that it is clearly a research problem in the true sense, for there is much yet to be learned, and there is a great deal to be systematized. I therefore approach this summary as I would approach any problem of research, with the effort to see what steps should still be taken in order that the situation and the desirable solution may stand out in stark clarity. If, in thus summarizing, I appear to question some of the opinions that have here been ably presented, I do so in order that this conference may approach as closely as possible its true objective of presenting in sharp relief the various facets of the shelter problem.

In tackling any research project there are many criteria which those who have had long experience in research matters have found it essential to apply at the outset. The success of any research program depends in no small degree upon the care taken in this initial weighing and examination. The most important criterion is to state explicitly at once the question which is proposed and to which the research program is expected to supply the answer. Only too often have I seen a research program, completely elaborated with buildings, personnel, and impedimenta, bogged down for the simple reason that those who instituted it did not initially define its exact objectives.

In this particular field of low-cost housing how, then, do we define the objective? It is easy enough to do so loosely, but loose definitions cause wrecks and make bridges fall down. As an engineer, I have a very natural inclination to define in terms of minimum costs. We have the suggestion in these papers and elsewhere that there be established a minimum standard of housing and that, by subsidy or otherwise, individual housing should be prevented from falling below this standard. Cannot we state that this standard should be so set as to impose the minimum current overall cost on society? This cost is made up of two parts: first, that necessary to build housing up to the specified standard, and second, the cost to society of the social burdens which the presence of inadequate housing imposes. Undoubtedly as the standard is raised, the cost of meeting the standard goes up in accordance with a reasonably determinable curve. It is also evident that as the standard is raised, the cost to society of the presence of marginal areas, due to health and social hazards, decreases. The total cost to society is the sum of these, and the sum of these two curves is undoubtedly the saddle-shaped figure which is thoroughly familiar to engineers. Once such a curve is before us, it is financially justifiable to set the minimum standard at the base of that saddle, and it is not justifiable from a financial standpoint alone to set it either above or below that point.

Of course it is possible to set other definitions, and perhaps the foregoing presents too materialistic a point of view. One might postulate, for example, that the standard should be established in such a manner as to insure the maximum general

rate of progress of society. Just how one defines progress is largely a matter of personal aspirations for the human race. Certainly any standard set on the basis which included such future considerations as are here implied would be above that set on the basis of all over current costs. We are, however, still in the situation where there are large housing areas well below the lower of these two standards, and until the low standard is at least approached there is little need for speculation to the higher brackets. For the immediate purpose, therefore, I offer you only the standard of minimum cost to society.

As a second important criterion, no research program should ever be undertaken without seriously questioning the reasons for attacking it at all and the reasons for attacking it at the moment. This involves in any field an objective consideration of the true value of the results which may be expected from the research, should the problem which is presented be actually solved.

On this point we have had placed before us today ample evidence and justification. I think none of us would question that at the present time this country is spending more money, if we wish to view it coldly, than there is any sense in spending, simply because the problem of housing control remains unsolved. It is demonstrable, if not already demonstrated, that a present and intelligent investment in this field on the part of society would yield adequate returns in the form of lowered ultimate total costs, entirely apart from the more intangible social benefits which would flow from such an investment. No group of engineers needs more justification for attack on a complex situation than the knowledge that a solution would save overall costs far beyond the expense of the investigation and study. That this condition exists is indicated from the facts and figures we have had presented, and those in the large existent literature on this subject. Beyond this financial point of view we all of us have the feeling that there are other and more important results to follow. The continuation of democracy in this world is not assured. Its foundation and support in this country in no small degree depends on the continued and appreciated progress of the mass of the people in their standard of living and the reflection of this progress upon the mass opinion which determines political trends. When it comes to votes, every individual's opinion is equally weighed in the balance. We need no more justification for attack upon the problem than now lies ready before us.

And how do we go about a study? A third criterion for the successful initiation of research is that the problem should be analyzed into its elements. In this complex problem of adequate shelter there are many, and they may be classified under the headings of economics, sociology, technology, and esthetics. Much study has already been carried on and a great many data have been gathered. It seems to me that these need unbiased sifting, classification, systematization, and correlation by those who think objectively and who are skilled in analysis and the application of logical processes and the considered balancing of evidence. Not that this has not been done; but it has not yet been done nearly enough. Repeating the disclaimer that I do not approach this research problem as a housing expert, I intend, as I proceed, to point out some of the things which it seems to me still warrant intensive and definitive study.

In our enormous country, with its wide range of climate, methods of construction, and habits of the population, no single striking solution is evident or should reasonably be expected. There will be no rabbits pulled out of hats. In such a comprehensive matter as housing, no single new technical advance in materials will produce a universal revolution in methods of construction. No panacea is going to appear in the form of a new building material which forms and attaches itself. No one social, legal, or political concept will be a national panacea. Multiple standards and concepts are necessary, not

only for various climates but also on account of the heterogeneity of our population in cultural and ethnic backgrounds. Progress must evidently come by the attack of many minds in many areas, and by the impact of diverse and manifold techniques.

The study is going on and should proceed in many places. We here at the Institute are attempting to play our part. Our work in city planning is, I think, well known to all of you. Many of you may not know, however, that we have a housing committee of our Faculty actively approaching this problem in the attempt to bring together the point of view of many individuals, such as those engaged in our Course in Building Construction, in Mechanical Engineering, in Public Health, and so on. The Institute is characterized today by the striking facility of joint effort by those in adjacent fields. Under a single roof, with the closest of intercourse between men of all stripes, we have made advances in borderline fields by reason of the joint action of men supplying varied techniques and backgrounds. The full force of this method and the interest of the entire Faculty are back of our efforts on housing and we intend thus to play our part in the large advance. The approach, within these walls alone, is being carried on along the four fronts of economics, technology, esthetics, and sociology. Yet the greatest contribution which this institution can possibly make to the problem lies in its primary reason for existence: It aims to educate men to think logically, analyze accurately, and judge with precision such complex problems as this one of housing.

Another criterion of well-ordered research is that it should pay early and complete attention to work done on the same problem elsewhere. One who approaches a new research problem turns immediately to this work by others in order to draw comparisons and distinctions, not only to avoid repetition but to profit from advances elsewhere. We have had a presentation today of housing achievements in England which we all view with admiration, and there is much for us to learn from this experience. However, there is unfortunately not a complete parallelism, and I, for one, hope that the thoughts developed here may go farther, and that we may have additional presentations, by those who are truly expert in the field, of the differences which are inherent in the American scene if we attempt to adapt the English attainment.

We have here in America, for example, exceedingly high cost of labor in the building trades. Now do not misunderstand me. The true measure is not the absolute scale of wages in the building trades, but rather the ratio of this scale to the general scale in the country, and it is on this basis that we should compare with experience elsewhere. We take pride in the high standard of living of our skilled labor in this country, and it should be supported by every means possible. Upon it depend our general progress and a great deal of our self-respect. But the problem of high costs in building trades is not a simple matter. All of us, I think, appreciate that the annual income to this labor is not excessive by any means, and at the same time the cost to builders is unduly high. The reason is well understood, for the laborer receives a high unit rate and a low annual income. The solution is also apparent, for we must in some way attain a continuance and security of employment in this field. Only then can we expect unit labor cost to go down and at the same time the annual return to individual laborers to go up. No solution which does not produce both of these results and thus confer a benefit on both parties will be a solution at all. Until some organization or political unit is capable of achieving this end, our progress is severely cramped, and that program, wherever it may be located, which solves this detail of the problem, should have every possible encouragement and support.

In comparing the English system with our own, one should also not forget the extreme variation which exists in this coun-

try among the population. We are not a homogeneous, like-minded group, but a very varied one, with diverse habits, prejudices, and social aspirations. In this sense we have not one problem to solve, but many. Britain has gone much further than we, both in the extent to which the central government stands ready to relieve the municipalities of the costs involved and also in measures of control. Some British measures, such as regulating the number of families allowed per acre to 12, are startling when we realize, for example, that 800 to the acre exist in the North End of Boston. The extent to which government can successfully proceed in such matters depends not only upon the complexity of the problem involved, but also upon the way in which the government is organized, and the effectiveness with which its units discharge their respective functions.

There is a growing tendency, born of loose and emotional thinking, to assume that any public need can be met only by an extension of government; the capacity of government is blithely held to be unlimited despite our experience with prohibition enforcement, the NRA, and other unhappy over-extensions. If government assumes our responsibilities to provide minimum housing, can we expect it to have the political capacity and integrity, for example, even to decide what individuals or groups should enjoy subsidized shelter? Political favoritism is largely absent from the conduct of public-health programs and from the care of the mentally diseased, but in these activities of governmental units the needy are more clearly marked and the strong professional influence of such groups as the medical profession is more readily brought to bear.

In such details we need more objective thinking — and I trust we may expect it from those who study our political institutions — from the standpoint of their practical operation under the influence of all present factors. I lean to the general thought that government operates best in established fields, and yet for various types of enterprises which seem to me to warrant specific conclusions on this point, I have seen no convincing critique of the success of government. Where techniques are well established and the support of public opinion is intense and genuine, government sometimes does a magnificent job. I hold an exceedingly high regard for the work of such units as our Public Health Service and our Coast Guard. To me there is much of comfort in the fact that high ideals of public service have been often maintained under conditions of extreme stress. Operating in such areas as these, government can adopt techniques and does so, as for example in the adaptation by the Post Office of new means of transportation.

To what extent, however, is government able and successful in a changing technical field, where flexibility, courage, and initiative are essential for proper adaptation; or is not such ability to adapt more an attribute of private effort than of government operation? To what extent has government proved its capability to cope with such an array of vested interests as tends to crystallize the building industry into its archaic present form? I am led to quote from a highly provocative article in *Harper's Magazine* for March: "The government," the anonymous author accurately observes, "goes into building, and the costs amaze us. . . . In the event of either subsidies or direct action by government, the tendency to leave the obstacles to lowered housing costs untouched and thus to fortify their position would be well-nigh irresistible." The world is full of heated opinions on these very matters. I would like to see them approached statistically and dispassionately, and I believe that a careful review, by an independent and unprejudiced group, of the history of performance of government in this regard would soon helpfully enlighten us.

Disappointing as the past few years have been, I feel sure there are under way technological changes which will greatly alter detailed housing technique in the near future. From this

point of view alone, it may well be that we will make more progress if the problems of large-scale lower-cost housing are undertaken by powerful private organizations, regulated by and encouraged by government, perhaps partaking of the nature of the limited-dividend corporations which have recently come into prominence. It is quite possible that lawyers, joining with sociologists and engineers, may invent other new corporate forms that will combine governmental and private management in a beneficial way. The successful creation of new political entities to bring together the threads of a particular technical problem, exemplified by irrigation districts and port authorities, indicates that our governmental system is in a formative phase favorable to such procedure.

Whatever burden of direct management we believe we should ultimately throw upon the various units of our government, we may well pause and consider the rate at which this load is imposed. The burden of housing management is especially hazardous in view of the manifold special interests involved. Our system of government needs strengthening in those attributes of *esprit de corps*, tradition, acceptance as a career, which are now strikingly present in some units and unfortunately absent in others, if it is to carry new and serious responsibilities; and here education has a clear duty to perform. It must be emphasized that if government itself plunges actively into this area in wholesale and direct manner, this very fact may prevent the later entrance of those private or quasi-public groups who might perform better. While it appears true that there are portions of the housing problem which can never be handled strictly on a profit-making basis, for the simple reason that those to be housed cannot pay the cost of the housing which is socially advisable, government subsidy can readily be extended to regulated limited-dividend or other entirely new types of corporations in several indirect ways.

There are certain functions in connection with housing which it is clearly the duty of government to perform: It lies within its purview to encourage, focus, regulate, and, more explicitly, to set standards. We already have detailed standards of housing practice incorporated into building codes established by small political bodies, often necessary for the protection of the public from an industry conducted by many small units, some of which are highly irresponsible. But these complex, detailed requirements often tend to freeze practice into its present uneconomic, asocial mold, and they are perpetrated and extended as often for the protection of special interests as for the protection of the public against malpractice. The setting of intelligent national standards, based on performance of materials irrespective of their commercial source, was begun by the Bureau of Standards and has been continued by the American Standards Association. Much is also being done in a restricted field by the Forest Products Laboratory. This is truly a function of government, and it should receive the support necessary to its active furtherance. It is to be hoped, also, that it may be extended, for the building industry sorely needs a reliable source of information in regard to the comparative performance under test of the commercial materials it employs. Thus to compare, critically, commercial products for the benefit of the public requires that there be a well-supported, authoritative agent, adequately protected against undue influence of any sort. It is not a service that industry itself can adequately supply. The commercial testing laboratories could do the work, but would have much difficulty in deriving support therefor from the industry itself. It is not a natural function for educational institutions. Government, through its scientific bureaus, should provide this definite aid to an important industry, in much the same way that the Bureau of Mines and the Geodetic Survey have supplied basic information to the industries to which they are

closely related, but extended to the definite comparison of commercial products offered in the market.

Another function, which seems to be clearly governmental, although also one to which the Brookings Institution might apply its extraordinarily penetrating methods, is that of assembling the true statistical situation which confronts the building industry. The Telephone Company bases its plans for expansion on careful statistical analyses of population trends and the communicating habits of groups. Certainly the housing industry, whose problems are preponderantly economic rather than strictly technical, needs similarly to base its programs upon a summary and analysis of the ascertainable facts of the situation with which it deals.

There have been comparisons at many times of the mass production of housing with the mass production of individual transportation, but here it is unwise to draw the parallel too closely. True, the production of many automobiles consists largely of an assembly of parts which have the benefit of mass production, on which the assembly of houses might be and is to a certain extent now similarly based. The differences occur, however, by reason of the fact that the assembly of the house occurs on a site and not on an assembly line. In all our study we should note the present trend in this country toward increased leisure, and concurrently — and perhaps as a result thereof — toward increased nomadism. Yet, in spite of the trailer, we will probably deal for some time to come with non-transportable houses, and this imposes many limitations on the comparison with the automobile industry. One limitation is strikingly apparent: Low-cost automobile transportation is supplied rather largely by reason of the secondhand market. The farmer, in other words, can buy an automobile, and one which will really run, for \$25. To a certain extent the low-cost house market is similarly supplied by obsolescence, but unfortunately usually with a permanent location in the wrong place. Nevertheless, the trend is important, and I believe research is necessary to determine how far it should be encouraged and how far throttled. Some of our zoning activity is a definite attempt to throttle this transference of housing down the scale, and other zoning activity has the effect of unduly accelerating such transfer. I am not personally sure of the extent to which such artificial interference with the movement of houses into low-income occupation is economically justifiable. Zoning has its uses, and we could hardly do without it, but like all good things I believe it is sometimes applied as a panacea without complete understanding.

I wonder whether our thoughts in regard to housing would have followed just the same channels in the recent past if the English language had contained no such word as prefabrication. Of mass production of building elements, we have had examples for many years. One single bathtub, passable by modern standards and constructed by a few workmen in an old-fashioned foundry, would cost about a thousand dollars. To produce handicraft lighting fixtures for a custom-made home is a luxury. The housing industry partakes generously in the economies of mass production of many of the parts it uses. It does not employ mass assembly, for its operating units are small, and for this reason also those benefits of organization and credits which are enjoyed by large industrial units are denied to it. If we discussed prefabrication less, and the pro-

saic matter of scale of operations more, we might come nearer to the heart of our present dilemma.

Some attributes of well-considered research remain to be applied. The method in science has been highly developed for attacking problems in an orderly way. There is usually involved the setting of definitions, the breakdown of the problem into elements, the isolation of their effects, accumulation of data, inductive reasoning from these facts to produce general relationships, the deduction of useful specific applications therefrom, and the final testing of these by experiment. Experimental procedure appears in two places: discovering facts and testing results. In this complex research problem of housing, what of the experiments? Some we have indeed had, produced by ambitious proponents of special methods or materials, and some guided by public-spirited organizations, anxious merely to try out promising leads. Few indeed of these have been closely correlated with the other attributes of a well-rounded research. In many cases it is hard to discover what facts they were supposed to evaluate or what conclusion they were intended to test. Of individual experimental houses we will undoubtedly have many more, human nature being what it is, and this is to be welcomed. I urge merely that, by coöperation among groups advancing on the problem from many fronts, they be comprehensively planned for specific purposes, and that by due examination and correlation their results be not lost. Of large-scale experiments, designed to exemplify in one effort many of the economic, social, technical, and esthetic phases of the entire problem, we have also had examples. They should be and could be exceedingly helpful. If this is to be true, the entire factual situation surrounding them should be fully and accurately published. To use such large-scale experiments merely as a means for advertising and advancing some discrete social or economic belief, would be to make a travesty of the scientific method.

In every industry which depends upon large-volume production, there is a summit to be surmounted. A vicious cycle appears in every case. In order to attain low costs, one needs large volume, and the volume will not appear until the cost comes down. We have today exactly this situation in the field of air conditioning for medium-class residences. There is evidently a gradual process of entry possible into this situation, as there was in the automobile field, by building first at high cost and low volume for the luxury demand and gradually working over into high volume and mass demand. This same method of getting over the hill, of avoiding the vicious cycle, does not appear to be available in the case of large-scale production of low-cost housing, for the methods of luxury production are not immediately convertible by small steps into the type of effort needed to meet the large-volume demand. To overcome formidable obstacles of this sort, much more than mere financial strength is needed. Flexibility and initiative are also necessary, and these are found most highly developed in private organizations. Yet a purely private organization, relying entirely on a profit, cannot cope with the problem of those who cannot earn the true cost of that housing which is socially desirable. The conclusion seems clear: A combination of governmental and private effort, combining subsidy with that regulation of profits which should properly accompany subsidy, is the sound method of attack.

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Moving to Cambridge

THE great direct current electrostatic generator designed by Robert J. Van de Graaff and built by the Institute on the estate of the late Colonel E. H. R. Green at Round Hill, Mass., is to be moved to Cambridge, where it can be employed more effectively in a program of nuclear research. The generator was originally located at Round Hill because of the availability of a large airship dock which offered an opportunity for testing Dr. Van de Graaff's design for the construction of a large-scale generator unit, as well as a vacuum tube of unique design for operation at very high voltages.

The generator was completed and had its first test in November, 1933. Since that time the research staff at the Institute's experimental station at Round Hill have been engaged in the exacting task of building a vacuum tube for use with the generator for experiments on the disintegration of matter. The successful operation of both the generator and the tube has now been conclusively demonstrated. The equipment is, therefore, being moved in order that it may be more conveniently accessible for use at the Institute by the staff and students of the Department of Physics in the program of experiments on nuclear disintegration.

Construction will begin this summer on a large welded-steel housing for the generator and supplementary equipment, some of which will occupy a large underground room in order that the research staff may be protected during operation of the generator. The new building will stand on the Institute's grounds a short distance from the main buildings, and it is expected that the generator will be reassembled in the new location and ready for operation by next spring.

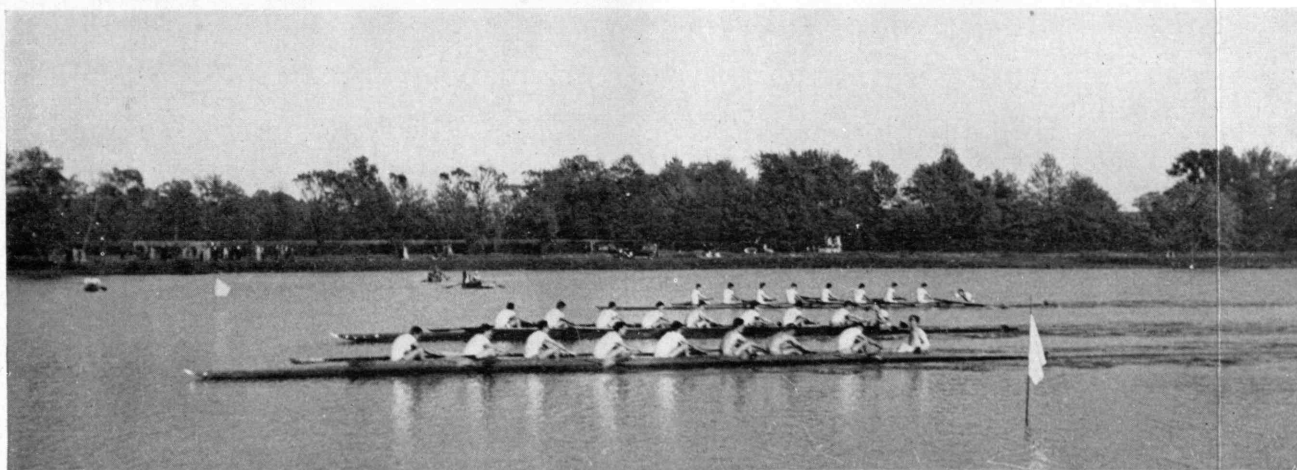
The decision to move the apparatus was made on the recommendation of Alfred L. Loomis, William D. Coolidge, '96, Arthur H. Compton, and Henry A. Barton, all members of the Visiting Committee of the Department of Physics, who expressed themselves as highly gratified with the accomplishment of the research staff at Round Hill. The nuclear research program at Round Hill has been in charge of Professor Van de Graaff and his associates, Lester C. Van Atta, Chester M. Van Atta, and Doyle L. Northrup, '31, all of whom will continue the program as it advances in the new location in Cambridge.

In November, 1933, when the generator had its first high-voltage test, it developed more than five million volts direct current but was never run at full capacity because of the limitation in size of the building in which it is now housed. In forthcoming disintegration experiments at Cambridge, however, the generator will be operated at comparatively low voltages.

The generator consists of two separate units, each with a polished aluminum sphere, 15 feet in diameter, resting on a hollow, cylindrical insulating column, 25 feet high and six feet in diameter. These columns are mounted on heavy, four-wheeled trucks operating on a railway track, 14 feet wide.

The Alumni Dinner

IN the pictorial spread on the next two pages we have pretty well told the story of Alumni Day save for the Jamboree Dinner, where the dim light precluded spontaneous pictures. Had photographs been possible we might now show you the expression on the face of Edwin D. Ryer, '20, when Toastmaster Robert E. Rogers introduced him as the (Continued on page 436)



LIGHTWEIGHT ROWING CHAMPIONS

Technology's 150-pound Varsity Crew winning the Joseph Wright Challenge Cup by defeating Harvard, Yale, and Cornell in the finals of the American Rowing Association's 150-pound intercollegiate eight-oared regatta held at Princeton in May. Technology's crew is in the foreground, Harvard next, and Yale beyond

EVENTS AND FACES . . .



Luncheon alfresco in Du Pont Court (attendance: 815)

FROM Germany, France, Texas, California, and way stations over a thousand Technology Alumni converged upon Cambridge on June 7 to celebrate the third of Technology's annual reunion festivals, each of which has shown an increase in attendance. On this and the opposite page, as caught by candid and noncandid cameras, are a few of the faces seen in Technology courts and some of the activities that filled a day that was, thanks to a finger-crossed reunion committee, bright and rainless for the better part — as Technology's meteorological service forecast it would be

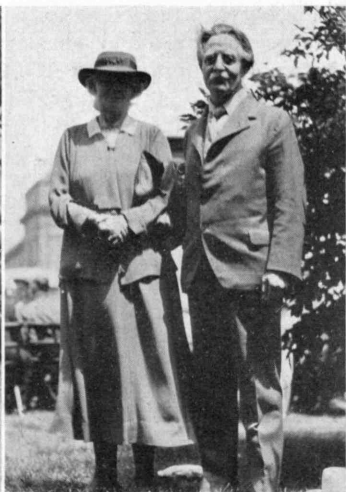
Photographs by Frederick B. Wolf, '28, and M.I.T. Photo Service



The Class of 1887, celebrating its 50th anniversary, had a special table presided over by President and Mrs. Compton



A group from 1907 that had on preceding days held its 30th reunion on Cape Cod. This Class was almost as ubiquitous as 1912, 1917



Sir Raymond Unwin came from England to speak at the jam-packed Housing Conference, and with him came Lady Unwin



Donald G. Robbins, '07, Retiring President of the Alumni, and C. R. Boggs, '05, new Vice-president



After a reunion at Marblehead (attendance: 87) the Class of 1917 prefers to remain seated except for such proctors as Secretary Raymond Stevens (left). The Class lost the sailing regatta to R. F. Burnett, '10



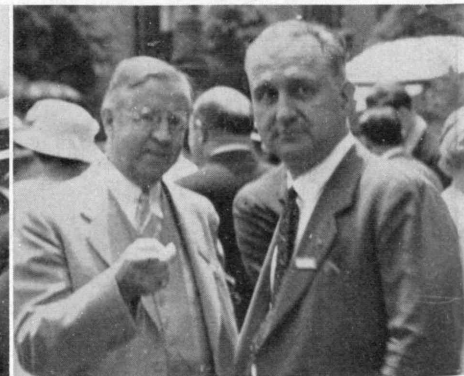
The technique of eating in Du Pont Court after a reunion in Marblehead by Harold E. Lobdell, '17, Dean of Students



Charles E. Locke, '96, aerates his fumiferous pipe while felicitating Arthur L. Townsend, '13, of the luncheon committee



Paul M. Wiswall, '09, of General Foods Corporation, New York, expert on food, smiled encouragingly at the luncheon (luncheon committee, please note)



Two patent lawyers forget claims, searches, infringement, and litigation: Paul A. Blair, '05, Washington, and Delos C. Haynes, '09, St. Louis

... OF ALUMNI DAY, 1937

CLASS-DAY EXERCISES

Members of the graduating class and Alumni met together in Lowell Court following the luncheon for a program that hit a high-water mark in class-day exercises, that was as a matter of fact the first blown-in-the-bottle, rip-roaring, substantial class day program seen hereabouts. Those responsible: Gelett Burgess, '87, who spoke for his Class; Erwin H. Schell, '12, who staged a vaudeville show for his (with the aid of Professor Albert A. Schaefer who easily fell into the somnolent part of a modern student); Philip H. Peters, '37, who spoke like all-get-out for the Seniors; Donald G. Robbins, '07, who spoke with earnestness for the Alumni, abetted by his flower girl and banner-bearer, Charles E. Locke, '96. And, of course, those who planned the party, William J. McCune, Jr., '37, and George B. Wemple, '37. The only thing wrong with the program was that few Seniors showed up. Next year's slogan should be: "Get the Seniors out for their own party!"

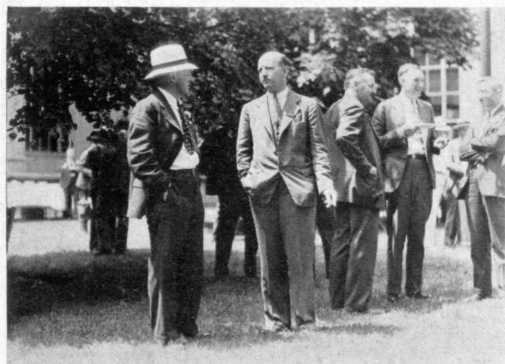


Gelett Burgess, who reluctantly admitted being a member of the Class of 1887, giving the Seniors his formula for happiness, which contained pi (and pie)



While these pictures unfortunately do not show it, one of the striking aspects of Alumni Day was the number of lively, enthusiastic women present, some from great distances. There were 98 at the women's dinner at The Country Club, Brookline, more at the luncheon, more at the speaking program following the men's dinner at the Statler

J. Lloyd Wayne, 3d, '96 (center, facing camera), of Indianapolis, in the middle of an anecdote told with gestures. He, together with 70 others, was present at a dinner given on the preceding evening by President Compton to Honorary Secretaries, club officers



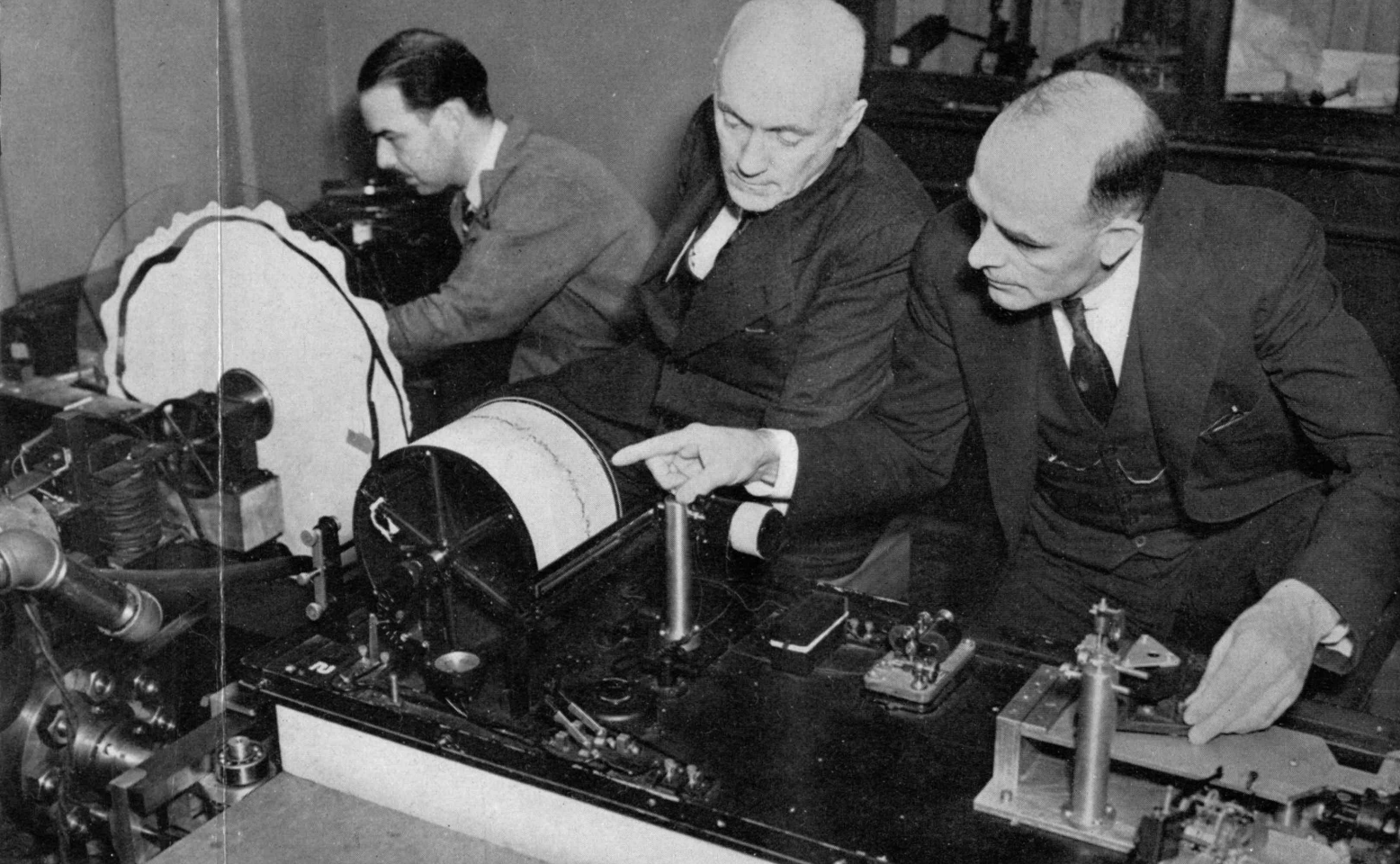
Treasurer Horace S. Ford and Donald B. Webster, '16, of Palmyra, N. Y. Beyond stand Dean A. Fales, '14, and Shatswell Ober, '16, automotive and aeronautical engineers respectively



Dean Vannevar Bush, '16, talks with James M. Barker, '07, Vice-president, Sears, Roebuck and Company, while beyond, Edward L. Moreland, '07, Head of Electrical Engineering, scratches his head as he looks at Nathaniel M. Sage, '13, Placement Officer at the Institute



Harold O. Bosworth, '02 (left), of Denver, who came with his wife and daughter; and a beaming picture of the Association's new President, Marshall B. Dalton, '15



EARTHQUAKE RECORDER

Above is shown Technology's earthquake machine reproducing on a small scale the motions of an actual earthquake in order to test a strong-motion earthquake recorder developed by the United States Coast and Geodetic Survey. Running the tests are (left to right): Professor Arthur C. Ruge, '33, in charge of the seismology laboratory; Captain N. H. Heck, chief of the division of terrestrial magnetism and seismology; and H. E. McComb, chief of the section of observatories and equipment of the Survey. (See below)

THE INSTITUTE GAZETTE

(Continued from page 433)

man who cooked the dinner. He blushed, not because the dinner was burnt (it was a corking good dinner and everyone we saw was perfectly able to enjoy it and did) but because he was unprepared for the applause that put the stamp of approval on the planning and work that went into the whole program on the part of him and his associates on the dinner committee.

We might have shown you Donald G. Robbins, '07, reporting the past year's work of the Alumni Association and not reporting his splendid contributions as president. We might have shown you the ovation to President Compton when he rose to report on the state of the Institute. Said Dr. Compton: "Gifts received or recorded by the Institute during the past year amounted to \$2,535,009. . . . It is such financial aid that enables us to continue our educational program as leaders in the field of technology, independent alike of government or other subsidy or pressure on policies, precepts, and personnel. . . ."

"The very able and thorough study given by the committee of the Alumni Council to the problem of student welfare objectives has brought forth with striking clarity the major inadequacies of our existing facilities for those extracurricular activities which keep Jack from becoming a dull boy. The committee concluded that the direction in which we should move in

improving these facilities lies in the erection of an adequate gymnasium. . . . In this recommendation . . . I heartily concur and recommend that it be made the next objective. . . ."

Even had the light been good we could not have photographed the striking three-dimensional motion pictures, taken mainly about the Institute, which were projected from 35-millimeter film for the first time before a large audience. They were introduced and explained by George W. Wheelwright, 3d, of the Land-Wheelwright Laboratories, Inc., developer of the polarizing material, Polaroid, which makes the three-dimensional pictures possible. For viewing the pictures the Committee, with the coöperation of the American Optical Company, distributed over 700 pairs of spectacles.

We wish we could show you the smile on the face of P. R. Ziegler, '00, chairman of the Alumni Day Committee, as the day drew to a highly successful close. For him and his able alumni associates The Review fires a journalistic salute, photographs or no, for their fine work.

Behavior of Earthquakes

A STUDY to gain more knowledge of how the ground, buildings, and other structures move during a destructive earthquake is being undertaken in the seismology laboratory of the Department of Civil Engineering, in coöperation with the United States Coast and Geodetic Survey. Strong- *(Continued on page 438)*

DISC WHEELS . . .

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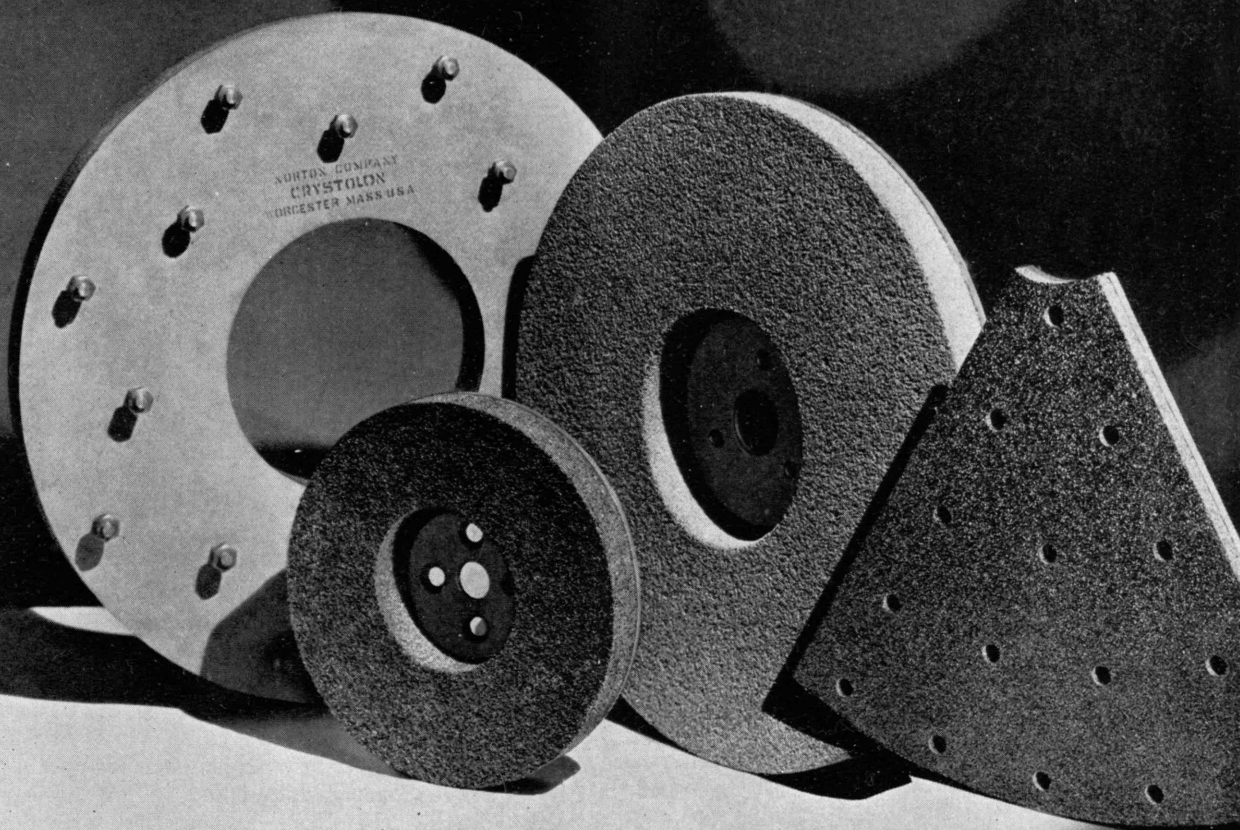
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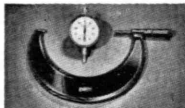
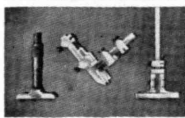
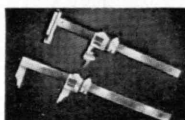
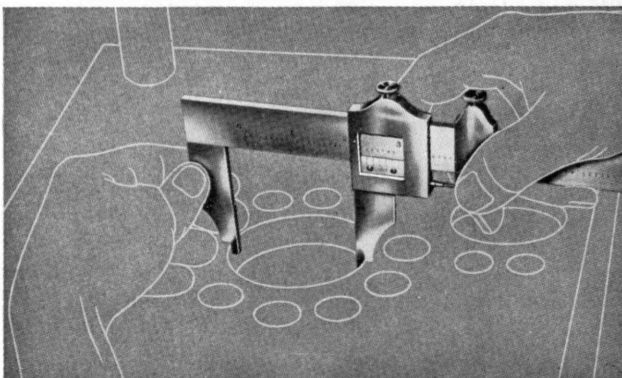
Manufacturers of braided cords of all kinds, including sash cord, clothes line, trolley cord, signal cord, arc lamp cord, shade cord, Venetian blind cord, awning line, and cord for many other purposes, also cotton twines.

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THE INSTITUTE GAZETTE

(Continued from page 436)

motion earthquake recorders, technically known as accelerographs, are used in this study in which the instruments are subjected to the motions of actual earthquakes reproduced in the laboratory on the earthquake machine developed by Arthur C. Ruge, '33.

About 50 of the strong-motion earthquake recorders are now operated in the western part of the country by the Coast and Geodetic Survey, and they are so constructed that they automatically start recording when an earthquake occurs. As the instruments are sufficiently rugged to enable them to record very severe shaking of the earth, their records will be of great value to engineers, who want to know in detail what goes on during destructive shocks. The ordinary seismograph, being a delicate device designed to record quakes hundreds or even thousands of miles away, cannot record destructive motions.

The accelerographs do not record the ground motions directly, but instead make records which show the accelerations of the ground during earthquakes. By a process of calculation the ground movements are deduced from the accelerograms. In order to assist in the interpretation of such records, Professor Ruge and H. E. McComb, chief of the observatories and equipment section of the Coast and Geodetic Survey, subject the instruments to earthquake motions by means of the earthquake machine. Then, since they know exactly how the instruments were shaken by the machine, they are in a position to interpret the records directly. It is only by finding out how the ground shakes during violent earthquakes that engineers can learn to design important structures to withstand these disturbances.

Graduation

TWO more than in 1936 — 534, to be exact — successful candidates were awarded degrees by President Compton at the commencement exercises of the Class of 1937, held at Symphony Hall on the morning of June 8. Bachelors numbered 342, including 21 who simultaneously received masters' degrees, having completed five-year courses. The 192 who received advanced degrees alone were divided as follows: 23 doctors of philosophy, 18 doctors of science, and 151 masters, compared with 24, 17, and 111, respectively, in 1936.

Included in this year's doctors of philosophy was Robert Burns Woodward of Quincy, "first in a class of one," who did a seven years' job in four. Entering as a freshman in 1933, he finished his bachelor requirements by June, 1936, meanwhile galloping onward to a doctorate in the field of organic chemistry with a thesis, submitted last May, entitled, "A Synthetic Attack on the Oestrone Problem."

The academic procession of the guests of honor — the Corporation, members of the 50-year Class of 1887, officers of the 25-year Class of 1912, and the Faculty — was again led by Chief Marshal Alexander Macomber, '07. It included: the Governor (Continued on page 440)



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The Institute publishes a variety of bulletins, as well as a catalogue of general information essential to the entering student. The Technology Review Bureau will be glad to send, gratis and post free upon request, one or more copies of any publication listed below, or to forward any special inquiry to the proper authority.

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2: For announcement of courses offered in Summer Session, ask for Bulletin 2.

3: For information on courses in Architecture, both Undergraduate and Graduate, ask for Bulletin 3.

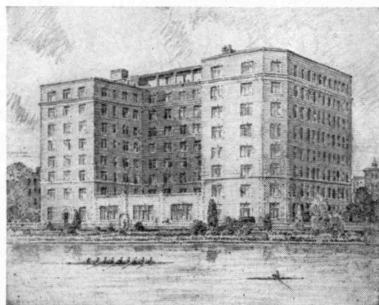
4: For a popular presentation of Educational Opportunities offered at M.I.T., ask for Bulletin 4.

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THE INSTITUTE GAZETTE

(Continued from page 438)

of the Commonwealth, Charles F. Hurley; Gano Dunn, President of the J. G. White Engineering Corporation, the Commencement Speaker; Rev. C. Leslie Glenn, Rector of Christ Church, Cambridge, who gave the invocation; Major General Fox Conner, Commanding General for the First Corps Area; Admiral W. R. Gherardi, Commandant of the First Naval District; Mayor J. D. Lynch of Cambridge; and Donald G. Robbins, '07, President of the Alumni Association.

Leading the long procession of degree candidates were: David S. McLellan of Newton, President of the Class of 1937, and the class marshals: George B. Wemple of Chicago, G. Richard Young of New York City, and H. Arthur Zimmerman of Buffalo.

Among the scholastic honors announced by President Compton (in addition to those recorded in the next article) were the following prizes: D. Fulton, Cohasset (Hunneman); B. B. Birdsall, Dedham (American Bureau of Shipping); A. F. Gomez, Cambridge (James Means Memorial); H. Udin, Newtonville (Sigma Xi); C. A. Blessing, Boulder, Colo. (Rotch); G. E. Hoffman, New Castle, Pa. (Boston Society of Architects); H. A. Kemp, Kewanee, Ill. (Chamberlin); D. R. McMullin, Newton (Alpha Rho Chi Medal); J. T. Murphy, Kansas City, Mo. (Special Rotch and School Medal, Course IV); G. Stephenson, Liverpool, England (School Medal, Course IV-B); J. A. Valtz, Lynn (Rotch Traveling); W. A. Wachter, Cincinnati, Ohio (School Medal, Course IV-B); and A. R. Williams, Normal, Ill. (School Medal, Course IV).

In Aid of Learning

FELLOWSHIP and scholarship awards amounting to nearly \$100,000 for graduate work during the academic year, 1937-1938, at the M.I.T., were announced in June by Harry M. Goodwin, '90, Dean of the Graduate School: The Redfield Proctor Traveling Fellowship, providing a stipend of \$1,500 for advanced work in mathematics at Cambridge University, was awarded to Donald C. Spencer, '36, of Boulder, Colo. He was graduated from the University of Colorado in 1934.

The Moore Fellowship in the field of chemistry was awarded to Walter L. Hughes, Jr., '37, of Foxboro, Mass., who will receive \$1,500 for study abroad. The Arthur D. Little Postdoctorate Fellowship in chemistry, also valued at \$1,500, was awarded to Joseph Kaminsky, '34, of Boston. The Arthur D. Little Fellowships in chemistry and chemical engineering, each carrying a stipend of \$1,000, were awarded to James W. Libby, Jr., '35, of Swampscott, Mass., and Ernest O. Ohsol of New York City.

Greer Ellis, Washington, D. C., a graduate of George Washington University in 1934, was awarded the Sloan Fellowship in Automotive Engineering — \$1,000 for graduate study in aeronautical engineering. James A. Cronvich of New Orleans, La., a graduate of Tulane

University in 1935, was given the Genradco Trust Scholarship, carrying a stipend of \$1,000 for study in electronics.

The Du Pont Fellowship for graduate study in chemical engineering was awarded to Thomas H. McConica of Findlay, Ohio. He is a graduate of the University of Saskatchewan in 1935. The fellowship has a value of \$750. The William Sumner Bolles Fellowship, with a value of \$1,000 for study in chemical engineering, was awarded to Thomas F. Reed of Vanceboro, Maine, a graduate of the University of Maine in 1936. Walter R. Hedeman, Jr., '35, of Baltimore, Md., who also holds a master's degree from M.I.T., was awarded the Henry Saltonstall Fellowship of \$500 for study in electrical engineering. The Susan H. Swett Fellowship for advanced work in biology, carrying a stipend of \$500, was awarded to Sumner Y. Andelman, a graduate of Harvard in 1935, whose home is in Boston.

The Louis Francisco Verges Fellowship in chemistry was awarded to William S. McClenahan of Brainerd, Minn. He is a graduate of Carleton College in 1933, and under the fellowship is entitled to a stipend of \$500. Albert C. Faatz, Jr., '37, of Maplewood, N. J., was given the Frank Hall Thorp Fellowship in Industrial Chemistry, which provides the sum of \$500.

In addition to these fellowships Dean Goodwin announced that 88 scholarships of \$500 each and 47 of lesser amount had been awarded to students in residence. Awards covering tuition were made to 52 teaching fellows in the science departments and to 54 assistants in the engineering departments, who are working for higher degrees.

More Power

THE Institute has purchased a 1,700-kilowatt motor generator to furnish direct current for various important research projects. The new power unit will be housed in a special building near the spectroscopy laboratory behind the Eastman Research Laboratory.

The power available from this generator will be useful for the powerful magnet designed by Professor Francis Bitter for investigating the nature and properties of metals and for studying the Zeeman effect, which is the effect of a magnetic field on the spectra of various chemical elements. The magnet is also expected to be useful as an adjunct to the low-temperature research to be carried on by Professor Frederick G. Keyes in the Department of Chemistry.

The Corporation

AT its meeting in June the Corporation elected Bradley Dewey, '09, a life member. Mr. Dewey, who is president of the Dewey and Almy Chemical Company, has long shown an active interest in Institute affairs, having been president of the Alumni Association in 1931-1932, and a member of various committees. He has been a member of its council since 1921. As a term member of the Corporation he has been active in administrative affairs, including membership on the Visiting Committee of the Department of Mining and Metallurgy, which recently was divided into separate departments.

New term members who now take their places on the Corporation are Marshall B. Dalton, '15 — member for duration of his term as president of the Alumni Association — and for terms of five years: Albert F. Sulzer, '01, Vice-president, Assistant General Manager, and Director of the Eastman Kodak Company; George E. Whitwell, '15, Vice-president in Charge of Sales, Philadelphia Electric Company; and William E. R. Covell, '23, Lieutenant Colonel, Corps of Engineers, United States Army, District Engineer. Retiring term members of the Corporation are Martin H. Eisenhart, '07, and Donald G. Robbins, '07, President of the Alumni Association for the past year.

Department Head

THE appointment of Professor Henry H. W. Keith, '05, as head of the Department of Naval Architecture and Marine Engineering has been announced. Professor Keith joined the staff of the Institute in 1910, and has been acting head of the department since the retirement of Professor James R. Jack last year. He is internationally known as an authority on the design and construction of naval vessels and for his research on the powering of ships.

TREND OF AFFAIRS

(Continued from page 403)

to keep his Gracchic promises, and an explanation of why German socialist or republican housing failed. He points out what many American housing reformers have failed to observe, that many of the great European housing schemes for workingmen were paid for by the United States because of its long-time policy of insisting on continued exports which were paid for only by further loans, and shows how these schemes collapsed when the credit supply was shut off.

Turning to America, he finds George Washington, Theodore Roosevelt, and, to a less degree, Woodrow Wilson real national planners, and by inference, at least, finds less praiseworthy the planning of the New Deal. He sees much to criticize in the great diagonals which ruined Garnier's Paris Opera House and the Philadelphia City Hall, the diagonals which would have ruined Chicago had the Burnham plan been carried out and which even now threaten to ruin Buenos Aires. No lover of the "civic center," he is glad that Mariemont, Ohio, has not yet enough money to finish its projected group. Detesting as he does the skyscraper, he points out that the New York "Region," after allowing 60% for streets, nondomestic buildings, and parks, and after housing 500,000 families in apartments at 50 families to the acre, has enough acreage to give every one of the other 2,500,000 families a half acre each. He indulges in a splendid and amusing roast on Le Corbusier and his *gratte-ciel*, "radiators of light" which Hegemann says are really "ghastly shafts," and a roast also on the late Fred French whose Knickerbocker Village, though having a quaintly pleasant (Concluded on page 442)

TREND OF AFFAIRS

(Concluded from page 441)

and rural-sounding name is really "one of the most congested and tallest conglomerations of dwelling in the world." Finally he utters the penetrating statement: "Real improvement in housing is possible only in times of a general rise in employment and wages." This would be a good doctrine for America to remember.

But the nonexpert will relish more the latter half of the book, in which the author begins to talk about American civic art. He has a tremendously good time with H. H. Richardson and especially with Lewis Mumford, whose admiration of that Falstaffian figure of "The Brown Decade" is not so measured as Mumford's criticism has been known to be. Taking Richardson's buildings one by one, he shows in detail the difficulties with the fenestration of the Pray Building, discusses the dingy interior of his most famous church, and finds that in the Pittsburgh jail Richardson reached the apotheosis of his art.

Richardson designed Trinity Church before he had ever seen any Romanesque, and Root made his Monadnock Building in the spirit of an Egyptian pylon before he had gone to Egypt. Hegemann concludes that it might have been better for American architects if they

had never seen a photograph, and rails at the architectural philosophy which could not find expression for a client's wish until it was able to adduce some building or monument of past record and repute. Sullivan, Mills, and others escape little better — until we reach McKim. Here the secret of the author leaks out. He really liked the Greek Revival and the Renaissance; he did not like Gothic and Romanesque. We find, for example, that he thinks Aix a nobler example of Gothic than were the buttressed types. What he really thought about Modern does not appear clearly although his spoken philosophy is that of the modernist.

The book ends with a very amusing and useful essay by Elbert Peets in which modern Washington is taken for a decentralizing sleigh ride. Remodeled Williamsburg, The Century of Progress, and Greendale, Wis., also pass under the critical microscope. This is a good essay, too.

Books like this ought to be read widely by educated laity. In a nation where architectural criticism has never thrived, where owners of buildings are or have been all too ready to bring libel suits, it is time we cultivated more widely the Hegemannian spirit which Mumford has also. If Richardson had had the benefit of a Hegemann, he might have gone farther toward greatness with the reduced girth occasioned by the deflating pinprick.

Architects have stewed in their own juices too long. More Hegemann might bring the stew to an edible boil.

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THE ENGINEERING PROFESSION

(Continued from page 406)

The answer is: It is not what the engineer does, but how he does it! not what the engineer's occupation is, but the intellectual processes by which he attacks that occupation. In other words, the method of engineers rather than their occupation is the characteristic of the engineering profession. Method is the common denominator of all engineers. While the subject matter of engineering will unquestionably continue to change in the future, not so with the method of engineering. It is certain that the engineer of the future will be using the present method 150 years hence, even if no prescience is capable of forecasting to what occupations that method will be applied.

What is this remarkable method that has changed the nature of the world? As is well known, it is the method of science, that process of reasoning based upon observed data and working hypothesis which, by inductive and deductive procedure and experiment, arrives at new knowledge.

It must be pointed out that, except where their qualities are combined, the engineer and the scientist are not the same person, however much they use the same method. Their objectives are different. Many attempts have been made to define engineering, and engineers do not agree on any one definition; but a definition which I worked out some years ago seems to stand the test of criticism and of perspective. It is as follows:

Engineering is the art of the economic application of science to social purposes.

Being an art, engineering thrives on repetition. It develops skill and it develops style. The second and third power plants that an engineer builds are likely to be better than the first, although there may not have been introduced a single new principle.

The scientist, on the other hand, shuts his mind as far as possible to all human prejudice and influence of feeling, save only for the divine fire of that imagination which creates the working hypothesis; and he learns how to discern truth and new knowledge in a study of the order of nature. The engineer, by the same intellectual processes as the scientist, applies that new knowledge to social service. The essential difference between the scientist and the engineer lies in the economic involvement of the engineer's work.

It is in this hot crucible of the economic test that all an engineer does must be tried. To repeat an old saying: An engineer is a man who can do with one dollar what any fool can do with two; and it is in his economic involvement that the engineer can rise to some of his greatest powers. Economics is not a physical science. It is a social science, bringing in problems of the human spirit and the behavior of man as man, and it is because the engineer's art deals with dollars and economic relations that he is bound into the great business structure of society in a way that the scientist is not. Being bound into this structure, he must be a man among men. He must be able to make his views prevail. He must be able to persuade and to contend. And he must be able to give blows and to take them. (Continued on page 444)

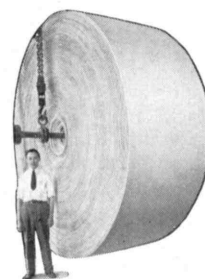
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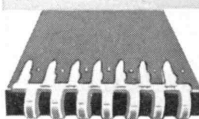
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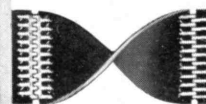
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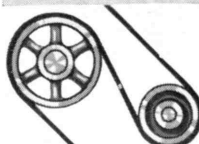
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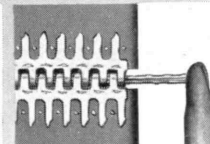
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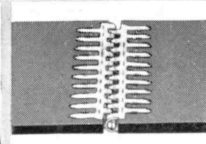
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THE ENGINEERING PROFESSION

(Continued from page 443)

These activities do not devolve upon the scientist in his laboratory. To the engineer, they are everyday life.

If an engineer's training neglects the great human mirrors of history and languages, particularly his own language, if his mind and heart are not sensible to the great social forces of his day and of his community, if he but feebly develops the subtle qualities of character that make for personality, his career as an engineer is limited, no matter how much science he may know. If the key to the scientist is thought, the key to the engineer is action. Value and utility are the engineer's criteria, rather than truth, which is the criterion of science.

For these reasons, as the engineering profession has developed, the center of education for engineers has been shifting more toward the humanities. This is one reason for the greater parts engineers are constantly playing today in the great roles of life. But while the humanities are of profound and increasingly recognized importance in the arch of an engineer's education, its keystone will always be science.

The Massachusetts Institute of Technology has given eloquent testimony to its conception of the part played by science in the education of engineers, by putting at its very head one of the great scientists of our day, President Karl Compton, and it has chosen one who possesses not only the qualifications of a great scientist, but also those capacities for human relations to which I have referred. In respect to those two types of qualifications, he illustrates their ideal combination.

Not all men with an engineering education take up the practice of engineering. It is significant how many are drawn off into the field of organization and other fields, where the engineering method of approach to problems and the engineering point of view introduce fermenting leaven into many of the processes of traditional business procedure. Partly for this and for other reasons, engineering has become the cornerstone of industry. In the precipitations of relationships brought about by big business and mass production, the function of management has fallen very largely to the engineer. In the field of management, involving the play of the human spirit at its best and at its worst, where, particularly in labor relations, generosity, loyalty, and independence are manifest as well as passion, ignorance, and vanity, the engineer's capacity for organization, leadership, and sympathy has rare opportunities.

Even in these days which we often think to be so far advanced, the sway of prejudice and of certain kinds of superstition is still profound. It awaits the light of reason and human understanding.

Executions for witchcraft were once a common part of everyday life. At the time when Salem shocked the Colonies by a series of nineteen such executions, literally thousands of witchcraft executions every year were carried out in Europe. Over a period of forty years there were eight thousand such executions in intelligent Scotland alone. The least unusual circumstance or unexplained phenomenon was liable to be charged to occult and demoniac causes, and constantly brought the penalty of death by flames upon upright and innocent persons or upon individuals who were unpopular or politically inconvenient, or who were merely intellectually inde-

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pendent. This madness, which had spread over most of the civilized world, was dissipated by the same great light that founded the engineering profession.

About that time the dawn of the scientific method began to shed its beams of intelligence into the darkness of human prejudice. The results which it accomplished in the social sphere through the dissipation of superstition, although overshadowed by the results in the sphere of the material world, have been of immeasurable importance. But the social sphere today is still a field which needs the light, a field in which the engineer with his training and point of view has open to him doors of rare opportunity. While not so sinister as the witchcraft problems, there are problems of prejudice in our social field that are, like those of witchcraft, based on distrust and ignorance, which separate man from man.

WHILE I have dwelt upon the essentially economic character of the engineer's field and the social service rendered by him in the cultivation of that field, such social service is an indirect one, effected by his function rather than by a disinterested will to serve. For performing his function he receives compensation, and it is therefore often urged that he is not entitled to personal credit for social service, since he is paid for it. In the case of certain engineers, there is much weight in this criticism. It is also urged that much of an engineer's work comes under the head of business for which the professional status cannot be claimed, and that the only really professional engineer is the consulting engineer, who, it must be admitted, is usually an ornament to the profession and perhaps more conscious of a professional responsibility than many of his fellow engineers.

But similar questions have beset the older professions, and they have been worked out in a tolerably satisfactory way. No lawyer considers it a reflection, especially an ambitious young lawyer in a country district, to be referred to as conducting a law business; nor does a lawyer consider that he is not a member of the legal profession if he accepts an annual salary from a corporation for continuous service. Equally unaffected as to his professional status is the physician who works for a salary as distinguished from fees for general practice.

The essence of the professional status lies in the moral obligation involved in the act of professing. This act is always personal; and it is in the engineer's personal relations to his fellows and to society and the obligations therein involved, wholly over and beyond obligations for which he is compensated, that his professional status resides. These moral obligations are the reasons why such particular weight is put upon character and integrity by the boards of examiners of the great national engineering societies before admitting men to membership, and why violations of professional ethics rather than failures in professional competence have been practically the only grounds on which expulsions from these societies have been based.

Turning to the older professions for our models, we find that questions of personal obligation to fellows and to society constitute the very foundation of the professional conception. In these older professions the engineering profession has noble examples of the practice of obligations that are self-assumed and disinterested. The medical profession has its Hippocratic oath peculiarly pledging its novitiates to the service of mankind, irrespective of compensation. (*Concluded on page 446*)

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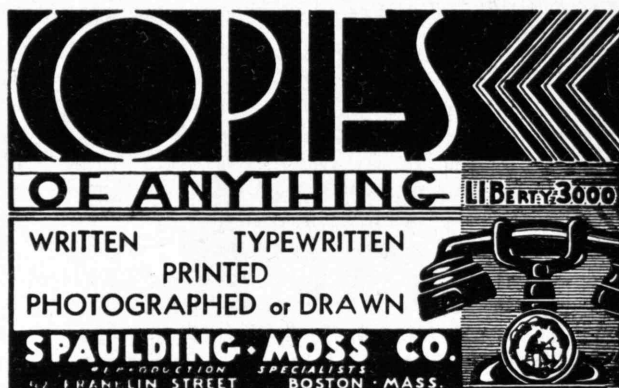
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THE ENGINEERING PROFESSION

(Concluded from page 445)

The legal profession, in its defense of penniless defendants and the vast amount of uncompensated service it renders to the courts and to the public as an arm of the law, illustrates its conception of professional service outside of the field of compensation. As to the clergy, its objective is exclusively social, and its devotion is unmeasured by compensation.

Engineers themselves have been the first to recognize obligations that inhere in a growing consciousness of the professional status. Their great societies have been created not merely for self-education and intellectual development, but to give expression, in their relations with each other, with other professions, and with the public, to a desire for a standard of personal relations and for the recognition of obligations, beyond those which are pecuniary. Just as the peculiar equipment of the clergyman, the lawyer, or the physician gives him a peculiar power and authority when disinterestedly devoted to social betterment, so does the equipment of the engineer.

The engineer today finds himself in a pivotal position in industry, intermediate between capital and labor, with the problems of both of which he deals intimately and which he is in a position to understand, interpret, and judge. There is in consequence offered to him, entirely in addition to the service which he performs through his engineering function, an opportunity for social service through his professional and personal status which, if he rightly conceives and seizes it, gives him a strategic advantage to render social service, which at this moment, the representatives of the older professions do not possess.

Is it too much to hope that with an enlightened method of approach and the habit of factual investigation which are the intellectual birthrights of the engineer, his increasing participation in management may bring to the solution of some of the social problems of industry a prejudice-dissolving light?

Such a light is capable of showing the path to a new happiness in work in which there is a recompense greater than all wages — joy in the act of creation. If there could come about a spirit of reciprocal confidence on the part of all elements, we could not fail to see increased production and increased leisure go hand in hand, securing those satisfactions deep in the consciousness of all Americans, which the immortal Declaration of Independence describes as the inalienable rights of life, liberty, and the pursuit of happiness.

To seize these opportunities for social service necessarily involves a demand upon the souls of engineers as well as upon their minds, which will be a test of their love of their fellow man. It is a case of *noblesse oblige*. To young and prospective engineers, trained under the aegis of science and with a new sense of the humanities, I can hope for only one answer to this test. Each of you will certainly have some occasion for meeting it.

When and as often as the test shall come, may there be no one of you who will ever ask, in the words of Cain, "Am I my brother's keeper?" unless you have already resolved in your heart the intention to answer, "I am."

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PLACEMENT STATUS OF 1937 GRADUATES

The results of a recent employment survey of the Class of 1937
are shown in the table below:

EMPLOYMENT STATUS	<i>Recipients Doctor's Degree</i>		<i>Recipients Master's Degree</i>		<i>Recipients Bachelor's Degree</i>		ALL GROUPS	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1937 GRADUATES as of May 27, 1937								
Have accepted employment	33	81	135	89	176	55	344	67
Plan further study	0	0	5	3	45	14	50	10
Report good prospects	3	7	3	2	34	10	40	8
Without satisfactory prospects	5	12	8	6	66	21	79	15
Totals	41	100	151	100	321	100	513	100

These figures speak for themselves

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NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

M.I.T. Association of Buffalo

Members of the Buffalo and Niagara Falls alumni clubs were favored with a visit by President Karl T. Compton on Thursday, April 29. Dr. Compton spent the entire day visiting several of the industries along the Niagara frontier. After receiving a warm welcome in the morning by a delegation of Buffalo Alumni consisting of Harry G. Brockington '25, Whitworth Ferguson '22, John M. Gaines, Jr., '26, and Marvine Gorham '93, Dr. Compton was escorted to the near-by Lackawanna plant of the Bethlehem Steel Company where he observed the local unit of the School of Practice in the Institute's Course of Chemical Engineering, conducted by John Eberhardt '36. At this plant Dr. Compton observed also the operation of the new twenty million dollar strip mill which was placed in operation about a year ago.

Following the visit to Lackawanna, Dr. Compton was driven to Niagara Falls where he was greeted by 42 members of the alumni club of that city at a luncheon at the Red Coach Inn. The luncheon get-together was conducted by L. M. White '12, President of the Niagara Falls Technology Club. During the afternoon, Dr. Compton had the opportunity of witnessing the operation of three large electrochemical industries: the Roessler and Hasslacher division of the du Pont Company, the Carborundum Company, and the Mathieson Alkali Works. Climaxing his stay along the Niagara frontier, he returned to Buffalo where he was the guest of honor at a formal gathering of Buffalo Alumni at the University Club. Seventy-two were present at this dinner meeting. Dr. Compton talked on various activities at the Institute and, following this discourse, conducted a question box relative to the progressive steps made at the Institute in the past years. The meeting was ably conducted by Harry G. Brockington '25, President of the Buffalo Club. — CARL J. BERNHARDT '28, *Secretary*, New York State Department of Health, 65 Court Street, Buffalo, N. Y.

Detroit Technology Association

The Association wishes to report a most successful winter season. Our present officers are: Robert C. Doremus '14, President; Franklin Fricker '25, Vice-president; John E. Longyear '26, *Secretary*; John D. Rumsey '33, *Treasurer*; Philip C. Baker '16, *Honorary Secretary*; Minot S. Dennett '11, *Scholarship Committeeman*; and Robert S. Gans '13, *Program Committeeman*. We have continued to list our Association in Detroit's telephone book

because newcomers and visitors are taking advantage of this facility to locate old friends and obtain meeting information.

We have had seven regular monthly meetings during the season. Attendance has varied from 30 to 80, with an average of 50 per meeting. Our officers and committeemen feel proud of this record. A brief résumé of our meetings follows: On September 18 we opened our season in a big way with a glorious golf and dinner at the Meadowbrook Country Club. The 30 members attending had an uproariously happy time. On October 8 about 40 Tech men gathered at the University Club to hear B. Alden Thresher '20, recently appointed Director of Admissions, tell of the progress of his work and of other happenings at the Institute. Coöperating with a committee of Lehigh University alumni on November 18, our own program committee arranged a joint meeting which consisted of a sumptuous dinner with beer at Joey's Stables and a trip through the Great Lakes Steel Corporation's mills at Ecorse, Mich. The steel company guides took us through in groups of about seven men each. Approximately 80 M.I.T. men, besides a dozen or so Lehigh men, attended this gathering. This turned out to be our largest crowd of the year, and our experience is showing that such trips are the crowd drawers.

On December 29 about 60 Alumni, undergraduates home for the holidays or traveling with Professor Schell '12, and high school students came to the Intercollegiate Club to hear Professor Schell talk about M.I.T. in general and sailing in particular. He exhibited movies of sailing on the Charles, which were very interesting. About 50 men came to the Detroit Sulphite Pulp and Paper Company at noon on Saturday, February 27. Guides took us through in small groups. At 2:30 p.m. we got together at Joey's Stables, where cocktails, lunch, and a good time were enjoyed by all. On March 16, 35 men assembled at the Intercollegiate Alumni Club to hear Jay C. Newman, special agent in the Federal Bureau of Investigation, tell something of his work.

Our annual meeting on April 23 was held at the University Club and about 60 members attended. The cocktail and get-together hour was warming, the dinner was delicious, the singing was glorious, and the speech was topping. Edwin S. Burdell '20 of the Department of Economics and Social Science, newly appointed Dean of Humanities at M.I.T., was the speaker. He told us in a very interesting manner of the humanistic trend in training at Tech and also reviewed recent general happenings, including the sale of the Rogers Building. — JOHN E. LONGYEAR '26, *Secretary*, 2000 Second Avenue, Detroit, Mich.

M.I.T. Club of East Tennessee

The annual dinner meeting of the Club was held at the Farragut Hotel, Knoxville, on the night of May 13. The following Technology men were present: G. E. Sylvester '87, D. M. Wood '06, B. R. Fuller '09, Phifer Smith '09, A. S. Peet '09, Erwin Harsch '20, M. M. Bauer '22, George Slover '21, D. W. Yambert '22, C. R. Ellis '23, J. C. Nowell, Jr., '23, E. S. Birkenwald '23, V. C. Hall '23, A. T. Gifford '27, R. W. Smith '33, W. K. Johnson '27, H. P. Emerson '28, R. E. Crawford '28, G. P. Palo '28, Robert Forbes '33, J. B. Stevens, Jr., '33, A. T. Regan '33, W. Partridge, Jr., '33, A. G. Kern, Jr., '34, and R. E. Hickman '36. Also present, as our guest, was Ross M. Cunningham, professor of marketing at the University of Tennessee, who will join the staff at Technology in September.

After the reports of the Secretary and Treasurer had been presented, the following officers were elected for the year: T. B. Parker '11, President; T. M. Taylor '22, Vice-president; G. P. Palo '28, Treasurer; and J. H. Kimball '94, member-at-large of the executive committee. — The speaker of the evening was Stanley Folmsbee, professor of history at the University of Tennessee, who gave a talk on "The Lost State of Franklin." Dr. Folmsbee is an authority on the early history of east Tennessee and his remarks on this subject were most interesting to us who are now located here. — ALBERT S. PEET '09, *Secretary*, Knoxville Glove Company, P. O. Box 138, Knoxville, Tenn.

Technology Club of Southern California

A dinner meeting of the Club was held on the evening of May 4 at the Hollywood Roosevelt Hotel. A count revealed that there were present 98 persons: club members, their ladies, and a few outside guests.

After a very fine meal, the party adjourned to the projection room, where a very interesting and instructive talk was presented by J. A. Ball '15, Vice-president of Technicolor, Inc. His talk was concerned mainly with the development of colored motion pictures, a description of the process, and the particular development that has taken place in colored animated cartoons. Illustrating his talk, Mr. Ball presented several colored cartoons by Walt Disney, plus a couple of colored motion pictures. Then he told us a number of the secrets of Mickey Mouse and Donald Duck, who Mr. Ball confesses are his favorite movie stars. Your Secretary agrees with Mr. Ball in his choice. — CHARLES H. TOLL, JR., '23, *Secretary*, 5717 Santa Fe Avenue, Los Angeles, Calif.

Technology Club of the Philippines

We present at this time a brief summary of the events of the past year as our notes have not appeared in previous issues of this volume of The Review. On September 8 a group, meeting at the Meralco power house and central offices, was privileged to visit and inspect the biggest commercial air-conditioned office in the Islands, done according to "Hoyle." We were highly impressed by the prompt and ready instructive answers of Mr. McCrea of Edward J. Nell and Company to the spontaneous queries propounded by some of our interested members. Mr. and Mrs. Schumacher and other Meralco gentlemen made splendid and generous display of their kind and good-natured selves.

The next excursion luncheon that followed this memorable one was held on October 2 under the sponsorship of the Philippine Long Distance Telephone Company. The luncheon was preceded by a visit to the Ayala Building, the automatic telephone system, the central office, the telephone exchange, the overseas radio equipment, and so on. It is regrettable that luncheon time here is midnight in Boston: We should have liked to have contacted President Compton by radio to express to him our congratulations over his stupendous program of objectives for the Institute and to send him our cordial greetings.

Our November schedule called for Fort Santiago, Robert S. Beard '05 managing; the December meeting for the Socony Vacuum Oil Company, Aubrey P. Ames '19 managing; January, for the School of Hygiene and Public Health, University of the Philippines, Pablo I. Dejesus '30 managing; February, for the Philippine Exposition, Inc., Martin P. DeVeyra, Jr., '08, sponsoring; March, for Benedicto B. Padilla '27; April, for the Bureau of Plant Industry, Primo A. Honrado '28, managing. — ERNESTO B. LEDESMA '23, *Secretary*, P. O. Box 444, Manila, P. I.

M.I.T. Club of Northern New Jersey

On May 17, the three top-ranking scholarship winners and their fathers were the guests of the Club at a dinner held at the Newark Athletic Club. Also in attendance at the informal gathering were the new President of the Club, the members of the scholarship committee and the Honorary Secretaries who sponsored the boys. — The last of the Club's monthly luncheons for the current season was held on May 13 at the Newark Athletic Club. It is planned to resume these get-togethers on the second Thursday of each month, beginning in October.

Plans are now under way for the annual duplicate bridge tournament with the Technology Club of New York. This will be the third observance of this major engagement between the Skyscrapers and the Skeeters. Since each Club has now won one leg on the jointly presented trophy cup, rivalry is at fever pitch and this year's classic promises to go down in history as one of the most fiercely con-

tested battles on record! — A. RAYMOND BROOKS '17, *Secretary*, Wayside, Brantwood, Summit, N. J. CAROLE A. CLARKE '21, *Publicity*, 10 University Avenue, Chatham, N. J.

M.I.T. Club of Sabine District

This is an account of the first meeting of the Club which was formally organized on April 5. A dinner was held at the Hotel Goodhue in honor of Dean Lobdell's [17] visit to Port Arthur and Beaumont, Texas. It was a fine success, with 22 men present. We met the Dean at Beaumont in the morning, drove back to Port Arthur for lunch, and spent the afternoon at the Texas Company refinery. In the evening the delicious steak dinner was followed by an informal discussion, with the Dean, of current policies at the Institute and we enjoyed two fine films of the dinghy fleet and Edgerton high-speed photography.

Our welcome guests included, in addition to Dean Lobdell: Dr. McAfee, head of Port Arthurschoolsystem, Mr. Neile '09, Mr. Freeman, and Mr. Park of the First National Bank of Port Arthur, who has a son, Bob, now at the Institute. — WINTHROP A. STILES, JR., '36, *Secretary*, 640 Stilwell Boulevard, Port Arthur, Texas.

M.I.T. Alumni Association of Greater Salem

The recent activities of the Association consisted of a bowling meet on May 4 at the United Shoe Machinery clubhouse in Beverly. Approximately 20 members turned out to spend a very informal evening. The next meeting of the Association will be the annual fall dinner meeting. — JOHN D. HOSSFELD '35, *Secretary*, 23 Hale Street, Beverly, Mass.

Technology Club of Schenectady

An informal dinner meeting was held on April 30 at the Mohawk Hotel in honor of the unusually large number of coöperative students now on test in the Schenectady plant of the General Electric Company. Karl T. Compton, President of the Institute, was the principal speaker of the evening. Short talks were given by members of the coöperative student body, the Institute, and the General Electric Company. Routine business of the Club was suspended. Members of the Albany club and other Alumni in the area were invited and the meeting was much enjoyed. — GILBERT P. TARLETON '25, *Secretary*, Patent Department, General Electric Company, Schenectady, N. Y.

Technology Club of Central Florida

The annual meeting of the Club was held at the Clearwater Yacht Club, Clearwater, Fla., on the evening of April 27. The members present included: H. M. Mansfield '83, T. H. Skinner '92, H. K. Moore '97, A. W. Higgins '01, A. N. Morton '04, A. C. Nichols '08, J. J. R.

Bristow '14, Fred D. Mendenhall '14, J. K. Ferguson '15, L. P. Geer '15, W. B. Newell '17, M. R. McKinley '19, M. T. Anthony '24, Bretton Perry '33, E. W. May '34, W. H. Mills '34.

After dinner the regular business meeting was held and all the present officers were reelected. Subjects of interest to the Club and of general interest to Technology men were discussed by various members. — MALCOLM R. MCKINLEY '19, *Secretary*, Tampa Electric Company, Tampa, Fla.

CLASS NOTES

1875

Five members of the Class met at the Engineers Club on May 25 to hold their 55th consecutive annual meeting. They were: Atkinson, Dorr, Eddy, Hibbard, and Simpson. After a bounteous lunch, the usual formalities took place and a vote of thanks was passed to Dean Lobdell '17 for the use of his name as sponsor for the privileges of the Engineers Club. Letters from those unable to be present — Bush, Jewett, Libby, Lyman, Prentiss, and Shepard — were read. After a very pleasant social hour the meeting broke up at 4:00 P.M. — THOMAS HIBBARD, *Secretary*, 4 Ridge Road, Milton, Mass.

1877

The following account was written by your Secretary and supplemented by Frank Skinner's son, William: Frank Colby Skinner, son of William H. Skinner, born on November 25, 1825, and Ann B. Babb Skinner, born on November 25, 1825, was born in Lawrence, Mass., on March 28, 1857, and died in Washington, D. C., on December 23, of pneumonia which developed when he was weakened by a heart attack. He lasted only four days. He married Nellie Hayes on July 1, 1879, and had one son, William H., born March 6, 1882. The latter married Marie Antoinette Brooks on June 26, 1912, and they have one son, Frank E., born February 22, 1918.

Mr. Skinner received his early education in the public schools of Lawrence, Mass., and then entered the M.I.T. He stayed there one year before entering the United States Naval Academy at Annapolis, Md., in the fall of 1874. He resigned from the Academy in April, 1877. From there he went to Lewiston, Maine, where he read law in the office of one of the judges of the local court and then entered the Albany Law School and was graduated from there in May, 1879. He went to Lincoln, Neb., and opened an office, but finding the chances small and his finances getting low, finally returned East and went to work for Mr. McMellon of the St. Louis Car Company as purchasing agent and traveled all through the wilds of Illinois and Indiana buying timber to be used in the manufacture of railroad cars. He was stationed at Cambridge City, Ind., where his son was born. He stayed there two years and was then transferred to St. Louis. He remained

1877 Continued

there only six months, when he received an appointment to the United States Patent Office at Washington, D. C., in June of 1883. He made the most rapid advance of any man who has ever been in the Patent Office, advancing from the grade of fourth assistant examiner to principal examiner in about five years. He won all of his promotions through competitive examinations.

Mr. Skinner devised a plan for and organized the classification division of the Patent Office, a stupendous undertaking, as there were more than two million patents to be classified. At that time there was no system for classifying these, and it took an attorney from one to 12 months to make a search and then there was no assurance that he had found all existing references. When Mr. Skinner got through, a complete search could be made within a very few days, as every class was covered thoroughly. His knowledge of patents was considered to be the greatest of any in the United States and he had been requested to lecture on patent laws to students of several universities. He also wrote a number of articles for the "Encyclopaedia Britannica." In December, 1908, he was appointed by the President to the board of examiners-in-chief, where he remained till March 28, 1933, when he was forced by law to retire. This was six years longer than the law allowed, but he had received three two-year extensions from the Interstate Commerce Commission. After he retired he lasted only three years, as he then felt that there was nothing much left to live for: He felt the loss of his life work. However, his brain was as active as ever till the day he died. He was a very wonderful man, and his loss both to the office and to his family and friends will be felt for many a long day. At the day of his death he was 79 years old. — BELVIN T. WILLISTON, *Secretary*, 3 Monmouth Street, Somerville, Mass.

1883

Next year, being our 55th, we shall endeavor to get classmates to make a special effort to be present and arrange a Class of 1883 day with good entertainment for families as well as members. This year's informal reunion will be presented in the fall, as notes are due too early to report in the July issue. — HARVEY S. CHASE, *Secretary*, Bridge Street, South Hamilton, Mass.

1887

During the past few weeks the Secretary has received many letters from '87 men, mostly written with reference to our 50th reunion on June 4, 5, and 6. A number of the letters were from men whom we have not had the pleasure of meeting at our dinners and reunions in the past. From Baltimore, Md., Charles H. Gardner writes as follows: "... It was most entertaining to me to get the news of my classmates of 50 years ago. As you perhaps know, I entered medical school in the fall of '87, graduating in '90, for the course was only three years then. I was fulfilling my cherished ambition, because

my father selected the profession of mining engineer for me. In November, 1891, I entered the public health service as an interne in the Marine Hospital here in Baltimore and received my commission in January following.

"Thus it occurred that I took up the roving life of a government officer, and while I hope that I may have been useful, it seemed to be in the remoter parts of the country, remoter from the East. When I was retired in 1928, I had hoped that I might be free to renew the friendships and acquaintances, and revisit the locales of earlier days, but fate decided otherwise, for shortly afterward I suffered an injury to the heart that has made me a virtual invalid since. So as you see, I will be denied the great pleasure of meeting my classmates again. It would be a keen pleasure, I can assure you, because I have never, in all these years since leaving Tech, met one of them. I am indeed sorry to learn of the death of Granger Whitney, whom I remember even in those formative days as capable, energetic, and forceful. I recall that during one of the summer vacations he served as a fireman on an Old Colony locomotive for the experience and probably the remuneration to be gained. When you meet with the old fellows in June, whose numbers have been sadly depleted by the scythe of Time, please give them my warmest greetings and say to them that it would be to me a high privilege to be one of the number gathered together, and that nothing but physical incapacity keeps me away. . . ."

From W. D. Sargent of New York City the Secretary is in receipt of the following interesting communication, significant of his interest in his classmates despite his previous absence from our reunions. "You have inspired me all right. I have heretofore let business interfere with pleasure — attending quarterly directors' meetings when I might have been playing with the members of '87. This year, barring weakness of the flesh, I hope to make the reunion. What a real fellow Granger Whitney was. I had not heard of his death. His genial smile and conversation were delightful, especially when talking of curling or apple orchards. . . ."

Herbert A. Wilcox, writing from South Pasadena, Calif., says: "Thanks for your letter telling of the death of Granger Whitney. I was both shocked and grieved. As our names were close together alphabetically and we both took Course III, we were rather closely associated all through our years at Tech. He was one of those whom I was looking forward with special pleasure to meeting again at our 50th. But we must expect such things now. Another ten years and there will be very few left of the Class of '87."

Lonsdale Green, one of the Secretary's most faithful correspondents, writes: "Your postal containing a notice of the passing of Granger Whitney came as a shock to me, as I was unprepared for any such news. I spent the next hour rereading most of 'Prismatic Verse,' for there is much of the author's own sentiments in that valuable little book. . . ." Green

announces that his golden wedding anniversary was celebrated on May 19 and was a great success. The congratulations of the Class are hereby tendered to Mr. and Mrs. Green on the happy event. May they enjoy many happy years to come.

N. P. Ames Carter, back from a South American trip, says: "Glad to hear from you on my (—) birthday. Sorry Granger Whitney is no longer going to cheer us and the rest of the world with his most genial personality, a really fine and unusual soul! We had a most interesting cruise to South America. . . ."

A letter from Billy Douglas, whom we have missed of late at our gatherings, is most interesting as well as reminiscent of Tech days. Recently the Secretary wrote Douglas, recalling Guy Kirkham's description of the famous Tufts baseball game, as related in his charming little book "From One Age on to Another," in which the writer assumes responsibility for the loss of the game when he (covering third base) failed to stop a throw from Second-baseman Douglas, thereby allowing two runs and losing the game. Douglas says: "I was very glad to hear from you and to have the excerpt from Guy Kirkham's book. I have known his cousin, Judge Kirkham, of New Britain, Conn., for a long time, and he promised to loan me Guy's book, but evidently forgot it. I am sorry that Guy did not let me edit his reference to the Tufts game, as it was just like Guy to take the blame when it was all my fault, as I made a boneheaded play that even a novice would have known better than to try. Anyone who played in that game will say the same thing. Too bad about Whitney, a very fine fellow who was liked by all who knew him. I only wish I might be with you in June, but having been under the weather for the last ten years I doubt my ability to get there. Kindest regards to yourself and to those who are able to be with you in June."

From George L. Norris, whom we have not seen in all the long years since graduation, the following welcome message has been received: "Your postal telling of Granger Whitney's passing on gave me quite a shock, as he was one of the very few of our Course III men left, and I was looking forward to meeting him again in June, after 50 years' interval. As I make out there are only five Course III men left: Gardner, Mosman, Nickels, Wilcox, and myself. I believe all will be at our 50th reunion, possibly excepting Gardner, about whom I have lost track for years."

Philip A. Mosman, whom we looked forward to seeing at the reunion, writes as follows: "Many thanks for your post card advising me of the passing of Granger Whitney. I had not heard of it before. I think the last time I saw Whitney was at the grand gathering in 1916, when the new buildings in Cambridge were dedicated. I was looking forward to seeing him in June at our 50th reunion and shall miss him very much. . . ."

Since the publication of the last number of the class notes, two more of the Class have answered the last summons:

1887 Continued

Edward F. Maher, and Freeman M. Crosby. The following is from the Boston *Evening Transcript* of May 11: "Edward F. Maher, local architect and a founder of the Boston Architectural Club, died suddenly yesterday while supervising construction of the St. Francis of Assisi Church rectory in West Medford. He was 72 years of age. Mr. Maher, who lived at 12 Biltmore Street, Jamaica Plain, was born in Baltimore and came to Boston when a young man. After studying at the M. I. T., he remained in Boston. During his career as an architect, he was associated with H. H. Richardson of Brookline, Fehmer and Page of Boston, Peabody and Stearns, formerly of Boston, Andrews and Jaques of Boston, and Ripley and LeBoutillier of Boston. He belonged to the Boston Society of Architects and the American Institute of Architects. He leaves three sisters, Margaret E. Maher, Katherine Maher, and Josephine M. Maher. Funeral services and burial will be in Elk Ridge, Md."

Freeman M. Crosby, for many years an active and interested participant in all the class functions, passed away at his home, 72 Trenton Street, Melrose, Mass., on April 30, in his 71st year. Funeral services, which were held at his home in Melrose on May 3, were attended by a very large number of friends, business associates, and members of Masonic bodies in which he held a prominent place. Winthrop Cole and the Secretary represented the Class at the services. The following article, outlining his career in the leather trade, is taken from the *Shoe and Leather Reporter*: "Freeman M. Crosby, retired sole-leather sales executive and one of the best-known and highly regarded men connected with that end of the business during a long and eventful career, died . . . after a lingering illness, at the age of 70 years. Identified with the sole-leather industry for close to 50 years, Mr. Crosby played a prominent part in its development. He was credited with being one of the best posted men in the industry on the matter of cut and whole stock, and saw these branches of the industry pass through many trying and revolutionary periods during his career. During the year 1886, Freeman Crosby, who was possessed of a cheeful and likable personality, became identified with the firm of Withington and Hall, which, at a later date, was taken over by N. W. Rice interests, owners of the Irvona Tanning Company. Mr. Crosby continued with the concern, which, in 1893 when the United States Leather Company was organized, became a party to the merger. In December, 1916, when the United States Leather Company of Massachusetts was formed, Freeman Crosby continued with the company as salesman in charge of the union and oak departments. Later, or about November, 1917, he was elected vice-president of the Massachusetts company, finally being elevated to the presidency of the same organization some years later . . .

"Mr. Crosby was held in high esteem by practically all branches of the industry and none more highly than by the cut-

stock end of the trade, with whom he maintained the friendliest of personal and business relations over a period of many years. At the time of his retirement the trade tendered him a testimonial banquet at the Ritz-Carlton Hotel in Boston, which gathering attracted a large number of members from all branches of the industry. Few members of the industry were as highly regarded as was Freeman Crosby, who had the faculty of making friends easily and holding them firmly. His kindly and genial disposition and his genuine earnestness and desire to help the other fellow at all times made for him a reputation that was one of his most prized possessions.

"It can be truly said that his passing will be genuinely mourned by all with whom he came in contact during an extremely busy, productive, and eventful life. Young and old alike were better for having had the privilege of coming in contact with him during his lifetime of service. He is survived by a widow; a son, Tom Crosby; two daughters, Mrs. John F. Carmody of Melrose, Mass., and Mrs. Walter S. Currie of Reading, Mass.; a sister; and a brother. He was a member of Wyoming Lodge, Ancient Free and Accepted Masons; Waverly Royal Arch Chapter, Melrose Chapter, Royal and Select Masters; Aleppo Temple and Coudersport Consistory." An extremely interesting poem written by him at the time of our 20th class reunion at Chebacco Island has just been received by the Secretary. It will be highly prized by the survivors of that memorable occasion. — NATHANIEL T. VERRY, Secretary, 1 Hamilton Street, Salem, Mass.

1888

Your Secretary recently received a letter from Mr. Oliver S. Hawes, 362 Rock Street, Fall River, Mass., stating that at the suggestion of M. B. Dalton '15, he was writing me regarding a beer mug marked "M.I.T. '88." It was given him many years ago by a Cape Cod hotel-keeper, who told him that it was left there after a dinner of the Class of '88. Mr. Hawes goes on to say that as "it really belongs to the class archives," he will gladly deliver it anywhere we want it, and closes his letter thus: "Hoping that it may soon resume its former activities as a circulation medium of exchange, good for its full face value in all the markets of the world and at above par in all cases of *voluntary* liquidation." Mr. Hawes is evidently a past master of finance and the king's English and has been thanked by the Secretary for the Class. The mug referred to is one of those used at our 25th-anniversary reunion in 1913 at the Cotocheset Hotel, Wianno, Mass.

We owe President Alfred an apology for stating, in the last notes, that he had climbed Wachusett Mountain 35 times, for Wachusett is only a molehill compared with the mighty Mount Monadnock up which he has led his husky band on Washington's Birthday for over a third of a century.

Fred Nichols, our golfing tourist, writes, in a six-page letter, all about his winter at Orlando, Fla. He also sent a box containing the following: Eucalyptus leaves, ten inches long and one inch wide, blossoms of cacao tree, orange blossoms, pecans, balls from sweet gum or liquidambar tree, and a bunch of red-black beads from the bead vine. He has played golf and followed tournament matches all winter, evidently in preparation for our 50th-anniversary golf matches, which he is planning to attend in connection with a tour of New England during the summer of 1938. We hope to play with him on our little course on Chebeague Island.

Lawrence Horton, a member of the Class during our freshman year, passed away on April 25 at the Massachusetts Memorial Hospital after a short illness. He was born and lived all his life in Ponkapog, Canton, Mass. He was a gentleman farmer and his chief hobby was acting as a volunteer member of the Canton fire department, to which he belonged for 52 years. Two years ago he was presented with a medal to mark his 50 years' service since his appointment in 1885. He was married on February 10, 1906, to Miss Ethel Chapman Lowry, who survives him with two daughters: Barbara, who is a teacher in Kingston, Mass., and Priscilla, a student at the Framingham Teachers College.

Due to previous engagements, our generous classmate, Ned Webster, was unable to entertain the Class at dinner on the Saturday before Alumni Day as he has done for the last eight years. Hence Alumni Day was made the rallying time for all '88 men. When you read this, if you attended, you will know how big a success it was. Up to May 11, the following had signified their intention to attend: Besler, Conner, Holman, Reynolds, Sawyer, Thompson, Wood, and Collins.

Following the example of the Supreme Court, your Secretary will now take a four months' vacation. You will not hear from him again until the November issue of *The Review*. — BERTRAND R. T. COLLINS, Secretary, Chebeague Island, Maine.

1889

One of the pleasantest as well as most impressive affairs the Secretary has ever attended was the testimonial dinner given on May 8 to our classmate, William Lincoln Smith, at the Boston Chamber of Commerce by the faculty, alumni, and students of Northeastern University on the occasion of his retirement from the chair of electrical engineering after 42 years of service. The gathering was large, representative, and enthusiastic. The speaking was both eloquent and witty, and a light and attractive touch characterized the whole affair. Lincoln, looking younger and more rotund than ever, was the recipient of numerous presents and testimonials. The announcement — made by the President — of the honorary degree of doctor of engineering to be conferred at commencement, he acknowledged in a graceful vein, and

1889 Continued

explained in a satisfactory manner (satisfactory to himself, that is) the famous affair in which he figured while a young assistant in Tech's electrical department, when by his own powers of research and deduction, or some say observation, he located the strips of steel, which had been irregularly disturbing the earth's magnetic field in 6 Walker, in the corset of a girl student. Lincoln was born and has lived most of his life in Concord, Mass., where it is evident that his fellow citizens have followed Emerson's advice "to manufacture school teachers and make them the best in the world."

Our classmate, Charles H. Deetz, whom we haven't seen much of lately, is cartographic engineer with the Coast and Geodetic Survey in Washington, D. C., and has written a most interesting book on the subject of cartography which can be had from the Superintendent of Documents, Washington, D.C., as "Special Publication No. 205" for 60 cents. It is copiously illustrated with examples of map making and is crammed with information relating to ground, aerial, and submarine surveys, various kinds of map projections, globe making, and an historical review of ancient map making, the evolution of shore and river forms, and much more information of great interest.

The Class held its annual dinner at the Boston Architectural Club on April 27. Owing to the unavoidable absence of our perpetual President, Billy Thurber, Frank Hart was appointed president pro tem, owing this honor to the fact that of the two members who wore evening dress, he was the first to appear. This shows what clothes will do for a man. The others present were Boutwell, Bridges, E. V. French, Gleason, Hunt, Kilham, Lewis, Marsh, Pearson, Orrok, W. L. Smith, and Williston, who was the other man in a tuxedo. A telephone call was made to the hospital where Hollis French was confined for an operation and the gratifying news was received that Hollis was getting on finely and would soon be back home. Speaking of Deetz's book, the conversation turned upon other books written by members of the Class, whereupon the Secretary proudly announced that he, too, had written a book which had a gilt top which he claimed made him one up on the rest of '89's literary set.

The Boston *Herald* of April 9 had the following: "Francis Russell Hart, President of the United Fruit Company, was elected president of the Massachusetts Historical Society at its annual meeting yesterday. His election marks the 13th president chosen by the society since it was founded in 1791. A director of many New England corporations and for a number of years on the executive committee of the M.I.T., Mr. Hart is also a member of the American Academy of Arts and Sciences, the American Antiquarian Society, the Colonial Society of Massachusetts, and a fellow of the Royal Geographical Society of London."

Bosworth writes from Vaucresson, France, that he expects to be here before long and says he is going to invite the

Class to lunch or dinner. So be it. — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston, Mass.

1891

Our friend and classmate, Leonard C. Wason, passed on, April 30, in Boston, after a somewhat extended illness. He was president of Aberthaw Company, builders, engineers, and contractors, which he organized soon after leaving M.I.T. Both he and his company were pioneers and leaders in the development of concrete construction and among the first to construct certain types of concrete structures. He was past president of the Concrete Institute and active in civic and national affairs. He leaves a widow and four sons, all of the sons being over six feet tall, as he was himself. Part of his undergraduate life was with the Class of 1890, and of late years he considered that he was affiliated with that Class, although he has been in the 1891 class records since graduation with our Class, and he has attended a number of our outings and reunions. A Christian gentleman of honor and integrity, with wide acquaintance and many friends. We understand that an account of his life and activities will appear in the 1890 class notes, but we insert this brief notice because of his many friends in the Class of 1891.

Your Secretary had a pleasant visit and dinner on a Sunday in May in Washington, D.C., with Jim Swan. He is living at the Hotel Washington. We talked for several hours, *in tempo presto*, even going back to undergraduate days. Jim seems both busy and interested, as one of the heads of the marine division of the Department of Commerce, in improving safety to life conditions on passenger vessels. He read a paper on recent developments in improving fire protection on vessels at the annual meeting of the marine division of the National Fire Protection Association in Chicago, May 10. This development includes automatic sprinkler protection for a number of passenger vessels, in which problem your Secretary has been interested for a number of years. Jim's office is on the first floor of the new (and enormous) Department of Commerce Building in Washington. Drop in and see him if you are in Washington.

Four '91 men — Swan, Blair, Dana, and Fiske — gathered around a restaurant table at the Congress Hotel in Chicago for a brief chat, get-together, and rah! '91. We were all attending the National Fire Protection Association's annual meeting, Jim being the latest addition to our threesome which is generally in evidence at these meetings. Incidentally, you may have forgotten that in our freshman year, Blair was vice-president, and Swan was on our executive committee. Dana and Fiske went to Chicago and returned together, attending the four-day session. There are many Technology men who attend this convention, representing insurance and industrial organizations.

The ranks of the grandfathers have been increased by at least two: Walter Hopton reports the arrival of Lester

Charles Hopton, Jr., at Easton, Pa., on April 27. Walter's son, and now his grandson, were named for two of his classmates, Lester French and Charles Aiken. — Will Wilder reports the arrival of a granddaughter, Joan Bliven, on April 8. — Linfield Damon's son, Lawrence, was recently married to Elisabeth Townsend Wheeler. Lawrence Damon prepared for college at Milton Academy and was graduated from Harvard with the class of 1924.

Charlie Wetherbee wrote Barney, the latter part of March, and mentioned a Mr. Pennypacker who is at Fore River, Mass., shipbuilding. It developed that Pennypacker is a cousin of Barney's, and he is assistant secretary of the Class of 1923. Charlie still lives in Bath, Maine. We hope he will come to our next party, whenever or wherever that may be.

Your Secretary planned to leave about June 1 on a trip to the Pacific Coast. He hopes, expects, and anticipates seeing some of the '91 men on the Coast, of whom there are now about 12, but men like George Hooper and Charlie Garrison move round so fast, always "tripping" somewhere, that it may be difficult to locate them. Los Angeles, San Francisco, Seattle, and home by way of Glacier and Yellowstone Parks, with Mrs. Fiske as guide and mentor, is the program. Incidentally, our company have plants in the cities mentioned, two of which have been built since my last trip. Fred and Mrs. Blanchard also left for the Pacific Coast about June 1. We will try to get some of the '91 men together for a Coast reunion.

Your Secretary and Mrs. Fiske were invited to a Swedish (referring to food) supper party recently at Dorothy Aiken Johnson's home in Belmont, Mass., given for Mrs. Aiken who was on her way to Aiken Manor, which will be kept open this summer. Dorothy will run her tea house and log cabins as usual. — The Alumni Office notifies us of the death of Mary W. Richardson at Memphis, Tenn., on February 7. She was a special at Tech and, according to our records, has been a teacher at the Central High School, Memphis, for a number of years. — William F. Keene's new address, according to the Alumni Office, is "Rayfield," Westport, Conn. He used to live in Westport and evidently has gone back there again. — Bert Kimball is now living at Redondo, Calif., and a postal card received recently mentions his interest in the class book.

Gorham and Mrs. Dana recently had a most interesting auto trip in Virginia, visiting Williamsburg, Yorktown, Virginia Beach, Hampton, Jamestown, Richmond, and so on. They went by boat to Norfolk and came home by auto. "Williamsburg is wonderful with its historic old buildings restored to their 17th Century magnificence." They went to Charlottesville and took the sky-line drive on the Blue Ridge Range. Gorham took some movies which we will hope to see.

Received the following letter from Hanington in Denver written April 22: "Mrs. Hanington and I returned last week from a month's absence. We went to

1891 Continued

Mineral Wells, Texas (look it up on map), where we took a course of drinking the waters, baths with all the necessary adjuncts, and so on, in hopes of some relief from my hobbling habit. I cannot see any change in my limp but certainly came home clean. A beautiful spot and wonderful hotel. Hundreds of people from all over the country. We came home via Fort Worth, Dallas, Oklahoma City, and Topeka, Kansas, some 2,000 miles. Came in from Wichita to Colorado Springs in one day, about 500 miles, but fine paved roads over long straight stretches of prairie. Kansas and Oklahoma dust made visibility about a mile, but we had no trouble. Last Friday, took the museum truck and went off toward Mount Evans. Got to timber line where we were blocked by huge snowdrifts. From now on my excursions will be only state wide. Going to Carson County next week where we have a crew digging bones — Stegosaurus, if you know what this is. ("A huge prehistoric monster with big plates on his spine.")

Charlie Garrison writes that he engaged passage for a trip to Alaska on June 18. His son and wife started round the world and got as far as New Zealand but had to return because of the serious illness of their daughter, Anne, who is now on the road to recovery. As Charlie left for San Francisco early in June, we may miss seeing him in Los Angeles. — George Hooper wrote of meeting Arthur Alley and his sister at Del Mar. He wrote also that Birks was recently in Pasadena, where his married daughter lives, and they called on the Hoopers. George has not yet seen Bert Kimball, as they missed each other on various calls. He mentions a Technology club meeting and a talk on color photography which he expected to attend.

In speaking of his trips he mentions the damage done by winter storms: "We have however had a trip to Santa Barbara and a long week-end in the Ojai Valley, where each spring there is held an interscholastic tennis tournament. Our daughters have played there several times and one was among this year's entries. There were about 550 contestants this spring and some very interesting and fast matches resulted. This valley is very beautiful in winter and spring but too hot in summer for comfort. Yesterday I motored up to Little Rock Lake, about 75 miles north of here, for some trout fishing and had a pleasant outing without, however, catching any fish, the day being so windy that fishing either from boat or shore was an impossibility. Later when the ice and snow are out of the High Sierra Lakes I will make another attempt." — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I. BARNARD CAPEN, *Assistant Secretary*, Early Convalescent Home, Cohasset, Mass.

1893

Howard R. Barton of Englewood, N. J., has a son who is a student at Technology, Class of 1940. — Arthur Farwell, immediately after his gradua-

tion in 1893 in electrical engineering, turned his attention to music, which ever since has been his chief interest and in which he now ranks among the leading American composers. In him we find the rather unusual combination of musical and mechanical tastes. This is brought out by an article in the *New York Times* of May 16 which describes at length his work as publisher and includes a picture of Farwell at his lithograph press.

Excerpts from this article follow: "Arthur Farwell, head of theory in the music department, Michigan State College, East Lansing, Mich., is issuing his compositions there in hand-drawn, hand-printed editions. The composer already has turned out four numbers in the long series under contemplation. As publisher, Mr. Farwell came to his new enterprise anything but a novice. Thirty years ago he inaugurated an earlier venture in the field when he established the Wa-Wan Press at Newton Centre, near Boston, Mass., for the publication of American music. While in existence, this movement aided definitely in placing the recognition of the native composer on a new basis.

"The process he finally adopted after first examining the possible means of music production was that of standard modern lithography, the offset, with zinc plates. First he draws the music on tracing paper, by a combination of freehand and mechanical processes, aiming to make it resemble as accurately as he can a regular engraved music page. A Kodolith paper negative is made from this drawing, by direct contact in a printing frame, and the sensitized zinc plate is then printed by arc light, in direct contact with the negative. The finished music is finally printed from the plate on a small press of the sort commonly used as a proof press in large plants. The covers are designed by the composer, who prints them in various colors. It is Mr. Farwell's belief that a time like the present, one of mass thought and mass action, is directly against the spirit of art, which must remain a matter peculiarly individual. He hopes his new venture may point a way which in time, and with wider development, may prove to be of benefit to the general cause of American music."

John I. Solomon is now associated with Harold Dessau, 16 Murray Street, New York City, in the pipe, tool, and fitting supply business. Solly says they handle all sorts of piping, from house piping to oil and natural-gas pipe lines.

William A. Tucker died at his home, East Lansing, Mich., May 1. He was graduated with the Class in the Mining Engineering Course and for the next three years worked as private assistant to Professor Richards '68 at Technology. In 1896 he began work in experimental ore dressing with the Calumet and Hecla Consolidated Copper Company at Lake Linden, Mich., a position which he was forced, because of ill-health, to give up three years later. After two years rest he began work again as instructor in mining and ore dressing in the Michigan College of Mines at Houghton, Mich. Later he was engaged for some time in experi-

mental work in metallurgy for private clients until ill-health again caused him to take up farming in California. In 1923, his health regained, he returned to Boston, where for a few years he was associated with Charles O. Tucker and Son, wholesalers of greeting cards. Finally he removed to East Lansing, Mich., and there became proprietor of a gift shop. Tucker was born at Roxbury, Mass., August 12, 1872. In 1908 he married Miss Georgianna Edwards, and they had one daughter.

Charles G. Waitt is enjoying life in Europe with brief visits, two or three times a year, to his Boston home. Although he retired from his insurance business several years ago and went to Europe for pleasure, he fell into the avocation of Continental correspondent for the *London Times* and other London and New York papers, which occupation has kept him traveling pretty much over Europe. In April he wrote: "Do you not know that after my rambles around Europe and the Near East that it is difficult for me to settle down to the humdrum of everyday life? I like my work; I like to be on the move. I enjoy meeting people of importance which I do in my newspaper work, and when too long in one spot my foot itches to be on my way. I have just returned from a visit to Poland, Russia, and Finland and now I have work which will take me on a special mission to Switzerland and Italy. . . ."

The Secretary and Mrs. Fay took a vacation cruise to the Mediterranean the past winter, during which they made a thousand-mile journey by rail and motor through Northern Egypt, Palestine, and a part of Syria, visited Athens, and spent about three weeks in Italy and on a motor trip along the Italian and French Rivas. Landing at Alexandria, Egypt, they went by rail 130 miles to Cairo, which is on the Nile just above the point where the river branches to form its broad delta. The journey through the delta country is a panorama of absorbing and ever-changing interest. The delta region, somewhat smaller than Massachusetts, supports a dense and picturesque population. The dark-skinned people, four-fifths of whom are of ancient Egyptian stock, are Moslems, speaking Arabic. Among the peasantry particularly, both men and women dress in long, flowing robes. The women are in black and veiled, and married women wear in addition a black nose guard which reminds one of football equipment. Their mud-hut villages are scattered throughout the flat delta wherever the ground rises above flood level. The delta country is divided into rectangular areas by a network of irrigation canals bordered by wide dikes, which serve also as highways on which camels, donkeys, water buffaloes, sheep, and black goats, as well as people afoot and mounted are constantly passing. The flood rise of the Nile at Cairo is about 13 feet and its peak occurs in August when water from the irrigation canals is let into the delta basins and allowed to stand about six weeks, until

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the river falls. It is then drawn off. Two and three crops a year are raised in the fertile Nile Valley with its subtropical climate. Of Egypt's area of 400,000 square miles, almost all of the country is desert and but 12,000 square miles, or three per cent, is habitable. This habitable region along the River Nile is about the size of Massachusetts and Connecticut and supports some fifteen million people.

Cairo, the capital, a city of over a million, is both very old and very modern. The Egyptian Museum with its vast collection of priceless jewels and relics from ancient tombs is deserving of several days' inspection. A short run of ten miles from Cairo, over an excellent motor road, brings one to the three pyramids of Giza and the Sphinx, which are above the Nile Valley at the edge of the sand-strewn limestone plateau known as the Libyan Desert, a part of the vast Sahara.

On the journey from Egypt to Palestine, one travels by the Egyptian State Railway to and along the Suez Canal as far as Kantara (West) and crosses the canal by ferry to Kantara (East) where the journey is resumed on the Palestine Railway built by Allenby during the World War at a cost of some 10,000 British soldiers' lives. The boundary between Egypt and Palestine, which is also that between Africa and Asia, is a few miles east of the Suez Canal.

Through Palestine and Syria Mr. and Mrs. Fay traveled about 500 miles by motor with a dragoman who was a well-informed historical guide. Arriving by rail early one morning at Lydda, near Jaffa, they motored for 30 miles over the bare, rugged, rock-strewn hills of Judea to Jerusalem, putting up at an excellent modern hotel, the King David. Jerusalem consists of the old walled city about 250 acres in extent and the newer city outside the walls to the north, west, and south. A half mile east of the walled city, across the deep Kedron Valley, is the Mount of Olives on the westerly slope of which is the Garden of Gethsemane practically unchanged since the time of Christ. From the top of the Mount of Olives, at 2,700 feet elevation, one looks down upon the Dead Sea whose surface is 1,300 feet below sea level and whose shores are the lowest dry land in the world. Five miles southwest of Jerusalem is Bethlehem with its Church of the Nativity protecting the spot sacred to all devout Christians. The overland journey of 200 miles from Jerusalem to Damascus is made over an excellent motor road, built since the War by the British in Palestine and the French in Syria, these two countries being respectively under British and French mandate by decree of the League of Nations. The route leaving Jerusalem extends northerly through central Judea and Samaria to Nazareth in Galilee, the northerly province of Palestine, and then leads eastward to Tiberias, the one remaining town on the Sea of Galilee. This latter lake is 700 feet below sea level. From Tiberias the road follows the westerly shore of the Sea of Galilee, climbs some high hills, and descends to the Jordan Valley, crossing the River Jordan just

below Lake Hula, near the northerly boundary of Palestine. Beyond the Jordan at this point lies Syria.

Two outstanding impressions remain from this journey through Palestine. The first is that Biblical history becomes live, vivid, and actual rather than a hazy myth. The second is the smallness of this Biblical country. While Palestine is about the size of Vermont, the southern portion is uninhabitable, a part of the Arabian Desert. From the hills of central Judea one can see at a glance the whole width of the country from the Mediterranean on the west to the deep rift of the Jordan Valley on the east, and pretty much the length of the country "from Dan to Beersheba" as well. The whole extent of Christ's ministry was within a compass 130 miles in length, an area corresponding to the portion of Massachusetts east of the Berkshires and omitting Cape Cod.

From the River Jordan there is a drive of 60 or 70 miles over a semidesert plateau to Damascus, the capital of Syria and one of the oldest cities in the world. Two of its principal sights of interest are the fine, old Mohammedan mosque and "The Street Called Straight." While Damascus by direct route is less than a hundred miles inland, because of deep snow in the high pass of the Anti-Lebanon Mountains, Mr. and Mrs. Fay were forced to take a much longer, circuitous route from Damascus to the coast at Beirut, and they missed seeing Baalbek with its colossal, ancient ruins. At Beyrouth, after about a week ashore, they rejoined their ship, the *Exeter* of the American Export Lines, which had come up from Alexandria, and there began their homeward voyage.

The following changes of address have been received: William E. Roberts, Dunedin, Fla.; Mrs. Londa S. Fletcher, 1204 Jackson Street, San Francisco, Calif. — FREDERIC H. FAY, *Secretary*, 11 Beacon Street, Boston, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 551 Tremont Street, Boston, Mass.

1896

With great regret the Secretaries report the death of Joe Driscoll which occurred on May 26, just as these notes were going to the printer.

Con Young has been heard from. Immediately upon reading in a recent issue of *The Review* that he had been lax in his correspondence with the Secretary, he sat down and wrote one of his typical, newsy letters. At the same time he wrote a somewhat longer and more complete letter to Lou Morse. Lou has passed that along to the Secretary as well, and the latter is now in a position to give full and complete report on Con and Abby. Con varied the past winter from his usual routine in that he did a little fishing and not a whole lot of social work and traveling from their headquarters in Fort Myers, Fla., but he turned laborer and reports that results are most satisfactory in promoting better health and a steady gain in physical strength. Almost every day during the first two months of his visit he put in hard work pruning trees,

stripping palms, coaxing rose bushes to stay green, watering flower beds and newly planted trees and shrubs. He also did a lot of work in restoring his acreage, which had grown up wild for several years with rank grass, weeds, bush and what not. More social affairs developed during the latter part of their stay in Florida, and at the time his letter was written early in May they were busy with a round of farewell dinners, picnics at the beach, steak roasts, last calls, and general packing.

Con's garb for labor consisted of brown cotton pants and just skin, oil-coated, above the waistline. He did make a fishing trip one day in March, going out 30 miles, with the result that the party landed 70 four- to ten-pound kingfish in less than three hours. They are fighting fish, and the boat looked like a slaughter house. When Con got home and stripped, he looked like a tattooed man. His biggest kick of the season was the shooting of a five-foot diamondback rattlesnake, which had crawled out of the thick grass in a vacant lot between Con and a neighbor. He has supplied a picture of the varmint and has written a most vivid description, which the Secretary is not going to give here in detail and thus rob the classmates of the pleasure of hearing it told in Con's inimitable way at class gatherings later on. At the time his letter was written, early in May, they were planning their return to Cape Cod for the summer, traveling by auto via New Orleans, Memphis, Nashville, and Washington.

Clark Holbrook is another bird of passage who reported his return to New Jersey from Florida about the middle of May. He has apparently entirely recovered from his accident of a year ago which prevented him from attending our reunion at Osterville. He regretted his inability to appear at Technology on Alumni Day this year, as he and Mrs. Holbrook were sailing for Norway, Sweden, and the North Cape on June 5, and would not return until the middle of August.

Jim Melliush came from New York for the week-end of May 2. He called the Secretary on the telephone and visited Rockwell. Through Jim the Secretary learned that Rockwell had blossomed out in a new Lincoln Zephyr auto, and also that Rockwell was going fishing. As a matter of fact, at the time these notes are being written — during the last week of May — Rockwell is actually on the fishing grounds in Maine, but no report of success has been forthcoming.

Bakenhus has been elected vice-president of the Metropolitan section (New York) of the American Society of Civil Engineers. He served so successfully as chairman of the program committee during the past year that he was promoted to vice-president. He has recently been away on a little vacation and business trip, spending about a week in Washington on work of the Naval Selection Board and a week visiting the United States Army Waterways Experiment Station at Vicksburg, Miss., where, as senior member of the board that recommended certain improvements for Hell Gate in New York

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Harbor, he studied the working model of that section, which had been prepared at Vicksburg. Vacation consisted of a two weeks' motor trip through Virginia, North Carolina, West Virginia, Maryland, and Pennsylvania. This included the annual meeting of the Society of American Military Engineers at Fort Belvoir, Va., where he was elected president for the ensuing year. This is Bakenhus' year for retirement on account of age limit, but one can hardly think of him as a retired admiral spending his time in idleness.

Bakenhus reported that he had an unexpected meeting with Billy McAlpine in Vicksburg and they had breakfast together. Billy was headed one way and Bakenhus another way. It seems characteristic of Billy that he is always flitting from place to place. At rare intervals he lights for a few minutes in Boston and the Secretary hears about it long after his departure. Something should be done about it. Why not appoint a committee to corral Billy and bring him to our next class reunion?

The Fullers finally reached Australia and spent six weeks, largely on shipboard, around Australia and New Guinea. Thence they journeyed to Java, Sumatra, Burma, India, Persia, Iraq, and Syria, seeing a great many interesting things en route. They were due to take steamer at Beyrouth about May 1, to sail through the Mediterranean and across the Atlantic to arrive home. One item in their many comments struck the Secretary and he is passing it along: Although occasionally they saw foreign motorcars on their trip around the world, those that they rode in, except in Indo-China, were all American make, even the busses across the Iraq-Syrian desert. Rental prices ranged from 60 cents per hour in the Southern Philippines to \$2.00 per hour in some British colonies where a heavy tax on gasoline prevails. There was not a single instance of delay by punctures or breakdown. This is evidence of the enterprise of the American motorcar industry and the reliability of its product.

Classmates will learn with great regret of the death of Mrs. Martha Callan, wife of Gurney Callan, which occurred suddenly from a heart attack while the two of them were riding in an automobile on Sunday, May 2, on their way to attend a concert in Methuen, Mass. The services were attended by the Secretaries.

Lou Morse sent word that he would be unable to join with the '96 fellows gathering at M.I.T., in Cambridge, on Alumni Day, June 7. He was due to attend the summer meeting of the American Society of Refrigerating Engineers that week at French Lick Springs, Ind. Lou is apparently a chronic joiner, or maybe it is just impossible to run conventions without him. He had been attending the spring meetings of the Refrigerating Machinery Association and the Air Conditioning Manufacturers Association at Hot Springs, Va., in the early part of May. He had another meeting to attend in Washington the last week in May, and still another the first week of June.

The Secretaries wish everyone a most pleasant and profitable summer. — Last minute flash: *Fish biting!* Rockwell. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1901

As these notes for the July edition of The Review are being written the indications are most encouraging that at least 15 classmates will be in attendance on Alumni Day, June 7, and possibly also for Tech night at the Pops on June 5. A full report of these events will, therefore, be given in the annual class letter which will be prepared some time during the summer and in addition a report will then be made of a very interesting luncheon of nine members of the Class which was held recently at the Technology Club in New York.

Other current news will also be included in the class letter, but we will now make special reference to some interesting information regarding Al Higgins: He has recently been elected president of the Florida Power Corporation with headquarters at St. Petersburg. Allan Rowe used to refer to Al as the Strawberry King. As I am not sure whether Al ever grew any strawberries, I am not certain just why he earned the quoted appellation; nevertheless, we do know that Al has traveled extensively and undoubtedly knows his strawberries. In any event, he has had a long and valuable experience in connection with the operation of public utilities and, from all indications, his present connections should develop most satisfactorily. — ROGER W. WIGHT, *Secretary*, Care of The Travelers Fire Insurance Company, Hartford, Conn. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 20 Beacon Street, Boston, Mass.

1903

On March 8, 9, 10, and 11, F. B. Jewett gave the Stafford Little Lectures at Princeton on the topic: "An Engineer Looks at the Social Implications of Science." These lectures were established by Grover Cleveland while he was living in Princeton. They are given yearly, and Cleveland gave them for a number of years, since which time they have been given by such people as Theodore Roosevelt, Charles Evans Hughes, John W. Davis, and Henry Stimson. In the main they have dealt with political, social, and economic matters, and this is the first year that they have involved applied science. This brief notice was supplied us by Jewett. We might add that this is an honor of which he may well be proud and the Class is glad for him.

Our other bit of news is not so happy: The latter part of February saw the passing of Dora Williams, a member of this Class in Course VII. For many years she was a member of the faculty of the Teachers College of the City of Boston. She died of pneumonia in Roosevelt Hospital, New York City, while preparing to sail for England to attend the coronation of George VI. Miss Williams was born in

Brattleboro, Vt., graduated from the Boston Normal School, later, the Institute, and did graduate work at the University of Chicago. She was one of the organizers and president of the Boston Teachers Club in 1916 and founded the Biological Club at the Boston Normal School. In 1929 she was a delegate to the Women's International League for Peace and Freedom at Prague. She contributed time, services, and resources to provide ambulance equipment and other aid for the men overseas during the War. She was a member of many well-known clubs and educational, music, and art organizations, and her passing so suddenly was a shock to her thousands of former pupils and friends. On April 3 a memorial service was held in King's Chapel, Boston, at which there were several speakers, and a program of her favorite selections was played by the organist.

Your Secretaries have been doing considerable traveling in the course of their businesses, the Assistant confining his mostly to New England, but the Secretary made a trip to the Pacific Coast, flying practically all the time by plane. Unfortunately we neither of us seem to be able to contact fellow classmates very often. We are still awaiting some news and replies to last month's plea. — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 89 Broad Street, Boston, Mass.

1905

By the time these notes are read our 1937 week-end (32d reunion) at Old Lyme will have become just another pleasant memory to about 30 classmates. More's the pity that your Secretary could not rub Aladdin's lamp to wipe out distances, melt the stern ties of business, or replenish purses so that we might have had a 100% attendance. As the regrets are read, I sense heartaches at the inability of many of the men to accept this annual opportunity to chum again with classmates. A real feeling of the satisfaction obtained at these gatherings would cause an even greater urge and bring even more to this spot, which seems to be as centrally located as possible.

Regrets and promises to make it next year, if possible, were received from Geraghty, Nabstedt, Morrill, Manson, Dwight, Charlie Dean, Mackie, Edmunds, Hinkley, Walter Brown, Louis Jackson, Drake, Walter Clarke, Bill Tufts, Landers, Mitchell, Hadley, Dickerman, Gouinlock, Geckler, Barnd, Laurence Fuller, George Fuller, MacBriar, Wentworth, Whitehouse, Gammons, and others. With the following regrets were comments in explanation: Charlie Mayer wrote: "My daughter, Betty, is to be married on June 6." Bill Keen: "My daughter, Eleanor, is to be married on June 5, and that lets me out." Last year it was college graduations and this year weddings and sickness, for both Chet Shaw and Henry Stevenson are unable to attend on account of serious illness in their respective families. T. Shaw says: "The 'old hoss' had to slow down this

1905 Continued

spring on account of an overtired heart. Hope to be working at normal speed soon." Be sure to make it only normal speed, T.

Roy Lovejoy, as traveling salesman for the reunion committee, tried to contact Bruce Hill while in Pittsburgh but missed him as Bruce was away at White Sulphur Springs. Roy tried to sell the Old Lyme idea to his son, who apparently gave his permission. — Harry Nabstedt has apparently adopted the Hallet Robbins philosophy, as he wrote: "Although retired from my profession, have many personal interests and cares that prevent my getting to Old Lyme. Hope to sometime. Regards to the boys." — Dick Senger must be working still for he sent a mighty fine (cash) donation to the class treasury and added: "Neither old age nor lack of wherewithal prevents my coming. Just too much business and (clause deleted for political reasons) make it impossible."

Bob McLean's memory must be bad for he again picked the first week in June for a business trip to Dallas, Shreveport, Memphis, Birmingham, and Atlanta. — Prince Crowell wrote: "For class commodore, I nominate Andy Fisher. I had rather be in a boat race than go to Old Lyme, but I can't do either as Mrs. Crowell and I are leaving Saturday noon (May 22) on the S.S. *Roma* for a six weeks' trip in Europe." — Ros Davis also nominated Andy, and if you don't understand what it's all about, it means you didn't read your Alumni Day notices. The Class of 1917 has challenged any Class to a dinghy race on Alumni Day. Andy and Carl Graesser have the application blanks for the M.I.T. Nautical Association and if they succeed in answering the questions necessary to prove knowledge of seamanship, will represent '05 in this race, provided they can decide which one will handle the rudder and who will take care of the ballast.

John Damon writes that he and Gene Kriegsmann were the only '05 representatives at the annual banquet of the Washington Society of the M.I.T. John adds: "My family (son, aged 5½) is growing taller, but otherwise no startling news." Sounds as though John might have the baby of the Class. He has the Secretary and Past Secretary Grove beaten by about a year. — Roy Walker (Hiram LeRoy on his diploma) wrote: "As for news, I can dispose of self very shortly by saying I am still with the same concern I started with when I left Tech. My wife is looking forward to our silver wedding anniversary next year and can still run circles around her rather deliberate, engineer husband. Alden, our only child, is no longer a child but is in his second year at Drexel Institute. Largely to please me, he tried to be a mechanical engineer but had to confess it had no charms for him and changed to business administration which he likes muchly." — Another '05 man sends his son to Alma Mater: Sam Shapira tells us his son has just been admitted into the Class of 1941 without examinations, which is going some in these selective days.

A beautiful announcement card, which we have thumbed over and found to be really engraved tells us that Hub Kenway — and his partner, of course — having outgrown their old offices moved on June 1 to Room 810, Chamber of Commerce Building, Boston. And to the firm has been added Hub's son, Herbert P., after a considerable patent apprenticeship in Washington. Hub sends us a patent proving that R. W. McLean, II, has invented an attachment to a cotton gin, which looks all right to a Secretary, but needs a patent attorney to figure it out. Get patent No. 2,075,586 and figure it out for yourself. — John Wiley and Sons, Inc., publishers of New York, announce that the best textbook on the subject is "Refrigeration Engineering," by H. J. Macintire, II, M.M.E., professor of refrigeration at the University of Illinois. It must be good as it has 415 pages and is marked \$4.50. Mac learned some of this from Getty, it appears.

Course IV men will remember E. Leander Higgins. After graduation he opened an office as an architect in Portland, Maine, where he became one of the busiest architects in the state. His son, Ambrose, who graduated from M.I.T. in 1935, writes that his father died from heart disease on October 6.

With some of the recent notices sent out from the Secretary's office an informal assessment of \$1.00 for class dues has been announced. Fifty-four men have responded gladly and the returns are by no means in. Even though the old '05 spirit is still 100%, it does take funds to keep the ball rolling. Have all voted who wish?

These changes of address are noted: Albert W. Walker, XI, United States Bureau of Reclamation, Fairfield, Mont.; Lieutenant Commander Dow H. Nicholson, I, from Bremerton, Wash., to Public Works Officer, Naval Station, 8th Naval District, New Orleans, La.; John T. Glidden, III, still at Lima, Peru, but now living at Avenida Benavides No. 768-B, Miraflores; Edward L. Davis, from Belmont, Mass., to 80 Evergreen Avenue, Auburndale, Mass. — FRED W. GOLDTHWAIT, *Secretary*, 175 High Street, Boston, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 209 Washington Street, Boston, Mass.

1907

Bob Albro is Works Progress Administration coordinator for the city of Chicopee, Mass., which means that he has complete charge of the WPA program there. This includes making up projects, designing, engineering, purchasing, estimating, planning of relief cases, and operation. Bob writes that "keeping 1,500 people going and happy with only 1,100 jobs available is rather strenuous and confusing."

A welcome message from Frederick Bachman tells us that since 1918 he has been a member of the firm of Kenyon and Kenyon, patent attorneys, with offices at 165 Broadway, New York City. Fred has an LL.B. from National University, Washington, D. C., and an M.P.L.

(master of patent laws) from George Washington University, Washington, and is a member of the American Bar Association, New York Patent Law Association, American Patent Law Association, and the bars of New York, New Jersey, and District of Columbia. Fred has a daughter who expects to enter Syracuse University in the fall of 1937; he had another daughter who was a student at Smith College, but she died on August 2, at the age of 19. His home address is 373 West End Road, South Orange, N. J.

Lester Brock is a salesman with C. P. Hall Company, 2510 First Central Tower, Akron, Ohio, organic chemicals for rubber compounding. He has three children — two daughters and a son. The older daughter was graduated from Wells College, Aurora, N. Y., a year ago June, having made Phi Beta Kappa. Lester writes that the boy "who has just come of driving age, which is the most noteworthy earmark of 1936 to 1937, not only has succeeded in making the police blotter for speeding but can show you how to take a car around a hairpin turn on two or three wheels, miss culverts, trees, poles, parked cars, cows grazing, by the thinnest experimental margin." — It was good to hear from Ralph Crosby. He is proprietor of Crosby's Glen Oak Service Station, 435 Crescent Boulevard, Lombard, Ill. Ralph reports that he has seven children and three grandchildren. We wonder if any '07 man can equal that particular record. — John Evans, one of the most prominent and influential citizens of Denver, Colo., has been president of the First National Bank of that city since 1928.

Albert E. Greene, manager of the Greene Electric Furnace Company, 2931 First Avenue South, Seattle, Wash., living in Medina, Wash., has three sons and a daughter. It is very interesting to note that the two older sons, one of whom is married, are both studying for the ministry. We are positive that this is a unique distinction in the family of an '07 man. In these days when few young men are attracted to the ministry it seems to us to be in order to extend class congratulations to Albert, his wife, and the two sons. — Harry R. Hall of Hyattsville, Md., is chief engineer for Washington Suburban Sanitary District, and lectures in municipal sanitation at the college of engineering, University of Maryland. He is married but has no children. — A recent message from Fred Jaccard, who is mechanical superintendent of Anaconda Copper Mining Company, Butte, Mont., gives the sad information that his oldest son died on January 17, 1934, at the age of 23. Fred has six children now living.

Tom Keeling, who is president of Nashville (Tennessee) Machine and Supply Company, sends a similar message, telling of the death of one of his sons on September 4, at the Johns Hopkins Hospital in Baltimore at the age of 19. Tom has two other sons: One is 15 years old; the other, 24, was graduated from Tech in 1935 and is now doing well with Electro Bleaching Gas Company in New York

1907 Continued

City. — John Kinnear, general manager of Nevada Consolidated Copper Corporation, McGill, Nev., has one son who is a member of the Class of 1938 at Technology.

Clarence Lamont wrote on April 26, on the letterhead of Edward Brown and Sons, insurance general agents, 510 West Sixth Street, Los Angeles, that he had his heart set on attending our 30th reunion in June, but that just before January first of this year he was taken ill suddenly with septic poisoning and spent ten weeks in bed, much of the time gravely sick. At the time of his writing, he was able to get to business for about half a day only, and it was out of the question for him to come East to the reunion. Sorry, Monty, we missed you.

Harold Libby (home address, 1614 Dilworth Road East, Charlotte, N. C.), is engineer of bridges for the Southern Railway, Eastern Lines, with office at Charlotte. Harold has two daughters, aged 20 and 10. — W. H. Martin has recently completed four years of work as engineer and examiner in the department of public works for the United States government and is now assistant engineer designer for the board of water supply of the city of New York. He is working on the East Branch Delaware River Aqueduct (estimated cost \$272,587,000). Henry's office is at 346 Broadway, New York City. — Henry C. McRae who, beginning in 1921, was engaged in poultry raising in Florida and then was completely broke in 1934 with the advent of the AAA, is now poultry man with Gibson Poultry Farm, Inc., Route 2, Box 207B, Bartow, Fla., after two years (1934 to 1936) with a survey crew in the CCC. Henry is not married.

In April, Eugene Potter was appointed building commissioner for the town of Hingham, Mass., in which he lives. Gene is surely qualified for this position as he has had over 20 years of experience in building construction. — Earl Reed, architect, with office at 2600 Tribune Tower, Chicago, is professor and head of the architectural department of Armour Institute of Technology, besides having a fine private practice. He is district officer of the northern Illinois historic American buildings survey and has done distinguished research work on Midwest pioneer architecture, besides being president of the Chicago chapter, American Institute of Architects, and chairman of the art commission of Evanston, Ill., where he lives.

After 13 years' experience in the United States Navy Construction Corps, James Reed, XIII-A, has been, successively, general manager of Celite Corporation, Schlage Lock Company, and, for the past four years, Golden Gate Bridge and Highway District, all in San Francisco. He suggests that when any of us go to that city, we do not fail to see the world's greatest suspension bridge. With office at 111 Sutter Street, San Francisco, Reed has a 27-year-old son, another son having died in 1922 when four years old. — Fred Schmidt, architect at 161 East Erie Street, Chicago, wrote that he could not attend

our reunion because his daughter, Betty, was to graduate from Cornell College, Mount Vernon, Iowa, on June 8. His son just completed his sophomore year at the same college.

Sidney Wells, Combined Locks, Wis., has specialized in the chemistry of pulp and paper for nearly 30 years; has held important positions with several organizations; and, since 1936, has been a partner in Paulson and Wells, consulting chemical engineers and advisors to the pulp and paper industry. He is a joint inventor of a semichemical process for reducing spent chestnut chips from tanning liquor to paper pulp for manufacturers of corrugated paper, originator of beating with rods, improved straw board, dunking of ground-wood telephone-directory paper, and improvements in cooking and full bleaching of kraft pulp. Sidney, like Ralph Crosby, has seven children, but there are no grandchildren yet! — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WENSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

Received a post card from Carl Gram early in May, mailed from The Hague and showing, in color, beautiful fields of tulips which he says were then at their height. Carl has been in Holland for some time and reports cold and rainy weather. — Charlie Belden was in Boston this spring, and your Secretary had the pleasure of talking with him a few minutes at the Exchange Club. He still wears the 10-gallon hat. — Among the Boston debutantes announced for 1937-1938 is Marguerite Dewey, daughter of Mr. and Mrs. Bradley Dewey.

A few days ago I dropped in to see Chet Dawes and obtained the following information: Chet has a new 30-foot boat at Boothbay Harbor, Maine. His son, Laurens, was graduated from Harvard Business School in June and is going with Marshall Field, Chicago, Ill., in the fall. Chet's daughter, Jane, will be a junior at Wellesley in September. Chet is chairman of the local section of the American Institute of Electrical Engineers. The *Journal of Engineering Education* in March contained an article on Harvard University written by him.

Tom Desmond, Henry Miller, Albert Peet, Tom Spooner, Harry Webb, and Paul Wiswall have been appointed Honorary Secretaries to interview prospective students of the Institute. — Jim Critchett's daughter, Ruth, was married on May 15 to Russell L. Boyer at Douglaston, Long Island, N. Y. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

Jack Babcock, who served a term as president of the Boston Society of Civil Engineers, was awarded a special prize by the society at its annual meeting. The following notice of this prize is from the

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Journal of the society, April issue: "A paper of particular value to the membership at large was selected this year by the board of government, upon recommendation of the committee on prize awards, for a special prize, namely, the presidential address of Past President John B. Babcock, 3d, on 'The Boston Society of Civil Engineers and Its Founder Members,' delivered at the annual meeting on March 18, 1936, and published in the July, 1936, *Journal*. The prize consisted of books, as follows: 'Fifty Years of Boston,' memorial volume issued in commemoration of the Tercentenary of 1930; 'Elements of Railroad Engineering,' by W. G. Raymond, revised by Riggs and Sadler; 'Early History of Modern Civil Engineering,' by Kirby and Lawson."

Last month it was mentioned that Berg Reynolds had been visiting Boston and that he appeared to be in fine health. We are sorry to say that since his visit here, Berg has been very ill and has undergone three operations at the Rochester General Memorial Hospital. The last we heard, he was on the way to recovery. — John Barnard and your Secretary had luncheon together during the week, and John is feeling happy once more because he has several fine residences to design, one being in North Carolina. — HERBERT S. CLEVELERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

Two letters bearing sad tidings reached me almost together on a rainy May morning, each telling that Bill Salisbury, II, had died. One was from Don Stevens, whom Bill's widow had advised by wire, and the other from Minot Dennett, with a thoughtfully inclosed clipping from the *Detroit Free Press*, which revealed: "Funeral services for William Conyne Salisbury, who died Tuesday night (May 18) at his home, 836 Lakeview Avenue, Birmingham [Mich.], following a heart attack, will be held at 2 p.m. Friday in St. James Episcopal Church, with burial in Acacia Park Cemetery. Mr. Salisbury was born in Chicago, March 5, 1889, and lived there until eight years ago, when he went to Birmingham to form the Babcock-Salisbury Gas Company of Birmingham and Pontiac. He was educated at Phillips Andover Academy and the M.I.T. Mr. Salisbury was a member of Delta Kappa Epsilon Fraternity, St. James Episcopal Church, and the Masons. Surviving are: his wife, Dorothy S.; a son, William D.; and a daughter, Carolyn S. Salisbury. He was the son of Mrs. Carolyn C. Salisbury."

So passes one who was a fine figure from the earliest days of the Class right on. A fine sprinter and possessed of a splendid, friendly personality, he was, during our junior year, class president and, during our senior year, track captain and third marshal at graduation. He went home to Chicago after graduation and for many years was in the sprinkler business, working for Rockwood Sprinkler Company. Later he was transferred to the Detroit sales office and ultimately formed a company of his own, as told in

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the clipping just quoted. It was about ten years ago that I last saw Bill, during one of my Middle West trips as alumni secretary. Never a rugged type, Bill then looked rather peaked and not in the best of health.

Don Stevens says he was privileged to have a short visit from Bill at his Ridge-wood, N. J., home a few years ago. "Bill had changed a lot physically," writes Don. "I was distressed. But he had not changed a bit in personality or charm. I am sure that Bill made a race of it — fine athlete that he was — right up to the end. None will be more greatly mourned." Minot Dennett said he hadn't seen Bill for something over a year. Our sympathy has been expressed by word and by flowers to his bereaved family and we shall always remember Bill Salisbury, II — a fine fellow!

At this late May writing 20 classmates have reserved tickets for Alumni Day at the Institute, June 7. At the moment the long-distance crown seems to adorn the brow of Louis Grandgent, IV, who will have come from Norris, Tenn. G. Arthur Brown, X, will have come from Vestal, N. Y., and from the Big City, Louis de Florez, II, and Heinie Zimmerman, IX. Harold Smith, II, will have come from Manchester, N. H.; Walter Wilson, X, from Andover, Mass.; Harold Robinson, I, and Ye Sec from Worcester; Roy MacPherson, II, from Framingham, Mass.; and the eleven Eleveners lined up from metropolitan Boston were George Cummings, VI, Henry Dolliver, I, Russ Francis, III, Jack Herlihy, II, Art Leary, XI, Morris Omansky, V, Chet Pepper, II, O. W. Stewart, I, Emmons Whitcomb, X, Gordon Wilkes, II, and Alec Yereance, I.

If you saw the May 3 issue of *Time*, you undoubtedly noticed the half-page photo spread with the caption "Mr. Cummings Sues the Big Bosses of Aluminum." There seated peacefully were the Board Chairman and the President of the Aluminum Company of America, along with five of the Vice-presidents. Who is that one other man in action, talking to Chairman Davis and President Hunt? You've guessed it: our classmate, Bunnie Wilson, XIV, the other Vice-president in the group.

When he wrote from Detroit recently, Minot Dennett said that "things have been rolling along fairly well here, in spite of strikes and other difficulties." — Here in Worcester Fred Daniels, VI, has been elected a director of the Worcester Y.M.C.A. for a three-year term. — Had a nice call here one morning from Bob Mather, VI, who happened to be in Worcester on business from Windsor Locks, Conn., where he and his wife and 17-year-old son reside. He is busy with consulting engineering, which takes him around quite a bit.

New addresses have been found for two classmates in the Middle West: Stafford A. Francis, IV, 10004 Arden Avenue, Rosedale Gardens, Plymouth, Mich.; and Alanson L. Palmer, V, 2562 Glen Echo Drive, Columbus, Ohio.

Best wishes to you all for a very pleasant summer and may the fall usher in increased prosperity for every one of you.

Good luck! — ORVILLE B. DENISON, Secretary, Hotel Bancroft, Worcester, Mass. JOHN A. HERLIHY, Assistant Secretary, 588 Riverside Avenue, Medford, Mass.

1913

At a fraternity reunion in Boston in May, I had the pleasure of seeing Bunny Brett, I, and Joe Strachan, I. I hadn't seen Bunny for 24 years and Joe for some ten years. Bunny has been continuously engaged since he left the Institute in mill-transmission machinery in New York. Joe, it seems, is a big shot with Congoleum-Nairn, Inc., and appears to be very prosperous. His oldest (there are two others) son will enter Wesleyan College at Middletown, Conn., this fall. At the same party Charles Trull, VI, and Bill Mattson, I, were present. I have written about both of these gentlemen only a short while ago.

It looks at present as if we will have had an attendance of some 20 men at the big dinner on Alumni Day, June 7. — From the Alumni Office I learn that Joseph Balch, VI, has removed to 233 Maynard Road, Framingham Center, Mass.; Frederick W. Blackwood, VI, has removed to 96 Governors Road, Milton, Mass.; Karl R. Briel, I, can be reached at Box 113, South Duxbury, Mass.; Alberto E. Lavenas, II, has removed to Avenida de Mayo 760, Buenos Aires, Argentina, S.A.; and Commander Charles D. Swain, II, to U.S.S. *Preston*, Navy Yard, Mare Island, Calif. — FREDERICK D. MURDOCK, Secretary, Murdock Webbing Company, Box 784, Pawtucket, R. I.

1914

As these notes must be written before Alumni Day, it will not be possible to record until fall the part our Class took in that event. In addition to the regular Alumni Office data, a class letter has also been sent out, and it is hoped that classmates will have appeared in their usual generous numbers. — It is with great pleasure that it can be announced now that Commander T. B. Richey is scheduled to be advanced to the rank of captain about July 1. As far as is known, this makes him the ranking member of our Class in naval or military affairs. Although a Naval Academy graduate, he has been a loyal Technology Alumnus as well and is a regular attendant at the New York annual class dinners. His present assignment is construction officer at the Brooklyn Navy Yard.

Werner T. Schaurte has come in for some recent publicity. Dr. Compton appointed him to represent the Institute at the 200th anniversary celebration of the University of Göttingen. *The Tech* opposed any recognition of the event because of the "debauchery of German education under Nazism." Dr. Compton, however, feels that the recognition is of long service of a distinguished institution devoted to science and research. Those of us who know Schaurte will welcome his appointment. He is now located at Neuss, Rhineland, and is an Honorary Secretary for Technology.

Tom Huff was in Boston recently. He is vice-president of Tuscar Metals, Inc., and is located in Philadelphia, Pa. While officially belonging to the class of '15, Tom has many friends in '14. — E. C. Wentz keeps up the monthly patent issue average for the Class this month. He has just been issued a patent for a photographic means of recording on a sound track. — H. B. RICHMOND, Secretary, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, Assistant Secretary, 1775 Broadway, New York, N. Y.

1916

For those who knew William Ogden, who was graduated with our Class at the Institute, the following will be of interest: Announcement has been made of the marriage on April 7 of Judge Ardra Hodgins of the Municipal Court, Yarmouth, Maine, to William Lardner Ogden of Deadwood, S.D., and Batavia Centrum, Java. Following graduation Mr. Ogden entered business in Calcutta. Since 1923 he has lived in the Dutch East Indies, where he is departmental manager for the Standard Vacuum Oil Company. He has a home in Batavia where he and his bride now reside. The couple went to Europe and sailed from Genoa, April 22, for Java. The bride is a daughter of Mr. and Mrs. Orin A. Hodgins of Houlton, Maine.

Your Secretary was pleased to receive a reply from Edgar S. Freed, who has not been heard from for some time. He was graduated from Course V and took his Ph.D. in 1918. He has been in Chile since 1922 as research superintendent and technical adviser to the management for the new Guggenheim process for nitrate extraction. It all sounds very complicated to me, but perhaps some of you chemical and mining engineers will be interested in this: "I say new process with reservation, as the process has been in operation now about 11 years, but new problems are always arising. Iodine recovery from the nitrate lead solutions — and by-product sodium sulphate, a new development — occupy a goodly portion of my time. The industry, as a whole, suffered severely during the depression, but 'every cloud has its silver lining,' and we are again producing at a fairly high rate of capacity." Freed was married in 1934 to Señorita Amalia Gonzalez. He has a boy nearly two years old. It looks as if he were settling down to become a regular citizen in Chile. It is a great pleasure to hear from classmates in such distant locations. Perhaps we can persuade Ed to bring his wife and youngster to our 25th reunion if we start working on him now — here is hoping. He should be entitled to a sabbatical leave about that time. Classmates wishing to get in touch with Ed should address him: E. Stanley Freed, Cia Salitrera Angelo-Chilena, Oficina Maria Elena, Tocopilla, Chile, S. A.

Those who attended the reunion a year ago in June will remember the wonderful golf scores of Bob Wilson. He has, since reunion, scored again, but this time in the business world. He has been made president of the Pan American Petroleum and

1916 Continued

Transport Company, The American Oil Company, and their several subsidiaries. More power to you, Bob, and don't forget our 25th.

J. B. Carr, the illustrious baker of the Class, comes across with a newsy letter advising us that the fruit cakes his company bakes are not for sale. Carr's reputation for baking fruit cakes is such that I hope he will put me on his mailing list next Christmas so that I will be able to pass on to the Class a firsthand opinion on this particular product of his factory. In his own words he adds the following: "I am going along very busily, baking lots of biscuits and managing to sell a few of them, and eke out a few more-or-less honest dollars as a result. If this continues, I hope to be able to pay for an addition which I am putting onto my house this summer in preparation for a proposed addition to my family. About three years ago we adopted a two-month-old baby boy and he is growing up to the age now where we feel able to handle another, and where he really needs somebody to divide attention and keep from being too utterly spoiled, so we hope to adopt another one this summer. All this family stuff is an old story to most of the Class of 1916, but is new business to me and, at this late stage, I am getting quite a kick out of it. Possibly by the time my classmates are getting into the grandfather stage, I will have been able to get together a few youngsters of my own." Carr speaks with enthusiasm about the good time he had at the reunion last June. Well, J. B., it is not too early right now to start planning on the 25th.

Chuck Loomis has been seeing something of Irving McDaniel. In fact, he and Mac have several times relived the good times we had at Saybrook. The following from Chuck's letter will be of interest to all members of the Class: "I asked Mac what he had heard from Dinah Coleman since the Ohio River flood. He replied that, so far as he knew, Dinah might as well have been drowned in the flood, that he hadn't heard a word. It might be of interest to all of the Class if you would write Dinah for an account of his personal experiences during the flood. My own were confined to the manufacture of a lot of sandbags for the United States Engineers, which, fortunately, they never had to use. 'I spent two days with Sandy Claussen in Chicago late in March at the annual meeting of the Bemis managers, and enjoyed the visit immensely. Incidentally, I heard further details of his dog. — One Harold E. Lobdell, known to present-day Tech students as the honored dean but to our Class simply one of the members of the lowly Class of '17, spent an evening and a day in Memphis some weeks ago. I spent most of that evening and the following morning checking up on our various classmates."

The May issue of *Power Plant Engineering*, on page 291, carried an article which quotes from Dean Joseph W. Barker's annual report to President Nicholas Murray Butler of Columbia University, in which it appears that our Joe has made a deep study of the physical equipment of

the engineering department of Columbia University, and profoundly suggests that \$2,500,000 be spent in bringing the physical equipment, in the way of buildings and laboratories of the Columbia Engineering Division, up to date. Can it be that Joe is inspired to make this report by his 20th reunion visit to M.I.T. on the Charles River? — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

On the eve of the 20th reunion there is little to be said that will not seem an anticlimax after the reunion has been held and when these notes appear. Both the dearth of material and the spring fever contribute to this lack. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass.

1918

Jeering in their oafish ignorance, many a person has declared that the multitudinous detail of the photograph cannot be art, but only accurate reporting. So Samuel Chamberlain, not satisfied with his reputations as an etcher, a lithographer, and an author on European architecture, has set out to enlighten the befuddled. With camera lens instead of etcher's needle, Sam has made artistic photographs of Boston's architecture. "His artist's eye," sez the *Evening Transcript* of April 24, "has not neglected the foregrounds, the backgrounds, the gardens, and the foliage, which are so important and integral a part of the Boston scene. While never neglecting or diminishing the importance of the particular piece of architecture which is the center of interest of his photograph, he composes his subject so as to present it in its most beautiful aspect. Even the patina which the architect must depend upon time and age to obtain is a quality that can be sensed in Mr. Chamberlain's photographs."

"Every citizen of Boston should feel a sense of indebtedness to Mr. Chamberlain for showing us how to look at and enjoy our art gallery of architecture. Admission is free. No matter in what part of Boston we live and work, we can enjoy it on our way to work, on our lunch hour, and on our way home. The beauty is undiminished when the shadows lengthen at the end of the day, and at night we can be stirred by the silhouettes, the sky line, and the deep black shadows. Indeed its ever-changing nature is one of the great charms of our gallery."

One of the more pungent contradictions of alumni professional activity is to be found in the recent purchase by David N. Rubin (civil-engineering-trained head master of the Boston Mechanic Arts High School) of Camp Rappaputs in Fryeburg, Maine. This will be conducted as an exclusive camp for girls; sort of neutralizing — if we get it right — the exclusive masculine features of Mechanic Arts. The camp itself is "delightfully situated on

the shore of Lake Lovewell." Now, girls, do be careful!

So come the summer interlude. May you recuperate within the forest's beckoning depths, for in the fall this column will be overflowing with the roistering activities of our looming 20th reunion. — F. ALEXANDER MAGOUN, *Secretary*, Room 4-136, M.I.T., Cambridge, Mass. GRETCHEN A. PALMER, *Assistant Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

When this went to press the following had indicated their intention of attending M.I.T. Alumni Day on June 7: Arthur Blake, Thomas Bott, Myles Connors, Bernard Coleman, Everett Doten, Roger Hall, Richard Holmgren, James Holt, Rogers Johnson, Harold McIntosh, George Michelson, Frank Reynolds, Arklay Richards, David Sanford, Jr., Hyman Selya, Carl Svenson, Donald Way, and Eaton Webber.

The following interesting bit of news appeared in a recent issue of the *Unicorn* of Theta Xi: "The appointment of Charles A. Chayne, M.I.T. '19, former assistant chief engineer, to the post of chief engineer of the Buick Motor Company was announced by Harlow H. Curtice, Buick President and General Manager. He succeeded F. A. Bower, who resigned because of ill-health. Chayne, who was born on February 6, 1898, and who received his B.S. degree in mechanical engineering in 1919, has always been interested in automotive engineering. While an undergraduate, he was a member of the advisory committee of aeronautics and was affiliated with the Aeronautical Intelligence Office in Washington, D. C."

"After graduation, he spent some time in the N.A.C.A. Laboratory, Langley Field, Va. In the fall of 1919 he returned to M.I.T. as an instructor in automotive engineering. He retained this position until the fall of 1926, when he was made research engineer for the Lycoming Manufacturing Company, Williamsport, Pa., manufacturers of automobile engines. Chayne joined the engineering department of Marmon Motor Car Company, as engine designer, in the spring of 1927. He held this position until January 1, 1930, when he accepted a position with the Buick Motor Company. He was in charge of the engine division until 1933, when he was made assistant chief engineer. He received the appointment of chief engineer on April 18. . . . This is certainly a well-earned promotion for Charles. It seemed to the writer that he knew almost enough to hold down this job before he left the Institute; while many of us were discussing high lights of the latest movie or dance, Charles was discussing inlet and exhaust valve timing."

Received an interesting note from Edmund J. Flynn, X, who is chief chemist of the East plant, New Jersey Zinc Company of Palmerton, Pa. Ed is married and has a daughter, Katherine, born in January, 1934. He occasionally sees George McCarten, who is with Calco at

Bound Brook, N. J. Ed makes an excellent suggestion, namely, that we should send out on the next questionnaire to the Class: "Of whom do you want to hear?" Many contacts could be established this way through our class organization after the data were assembled. Ed goes on to state, for example, that he would be interested to hear from or about Bob Bolan, Blake Darling, L. B. Smith, Jim Holt, D. H. Brown, Duke Herzog, Conterti, J. H. Kaiser, Jeff Mead, Ernie Perkins, Shedlovsky, and Selya.

I can tell you about some of these fellows: Bob Bolan is in Newark, N. J.; the name of his company, I believe, is the Miniature Lamp Company. Jim Holt is a professor at M.I.T., and Hyman Selya is in business in Boston. Shedlovsky is with the Rockefeller Institute in New York City. Darling is with the Travelers Fire Insurance in San Francisco. L. B. Smith lives in Beverly, Mass. I saw Duke Herzog around Boston a few months ago. He is living at 221 Prospect Street, Lawrence, Mass. John Kaiser is with Solvay Sales Corporation in Syracuse. Ed was apparently looking, without success, for my picture in the yearbook. I took Course VI-A, which meant that I worked at the West Lynn plant of the General Electric Company every three months and, as I recall, I was on one of these visits when the yearbook went to press. I was also out a year during the War, fighting the battle of Newport News, Va., and finally got through the Institute in 1920, although my degree in general engineering is marked "as of the Class of 1919."

Say, come on, you fellows, and let's have some more news! How about sitting down now, before you forget it, and dropping me a line — ARKLEY S. RICHARDS, *Secretary*, 26 Parker Street, Newton Centre, Mass.

1921

Wonders never cease! At long last a letter from Hazen Curtis Pratt and with it a two-column spread from the February 27 issue of the *Rochester Democrat and Chronicle* announcing beneath a two-deck, page-one scarehead that a War veteran flyer had jousting with the United States over a patent — and won! The clipping is illustrated with a picture of our hero that shows he has retained the youthful good looks we knew so well.

Says the article, in part: "Hazen C. Pratt, Rochester mechanical engineer, has won his nine-year patent-infringement action against the United States government. The former wartime Navy flyer sued for \$1,250,000, charging the government infringed on his patent when it installed on its airplane carriers arresting gears to enable planes to land on ships. The 40-page Court of Claims decision (finding Pratt's patent to be valid and infringed by the government) reads like a substantial chapter of United States naval aviation history. The drama and hazard that went hand in hand with the invention began in 1918 when, injured in a crash, Pratt was discharged from the service and returned to M.I.T.

to complete his Course. As early as 1920 he was working on the invention and won the government's attention that year. The Navy Department supplied him with a plane, and apparatus was attached, but, as the day for the first test approached, fire swept the hangar, damaging plane and gear. Delays ensued, and between trips to naval offices and factories, Pratt continued his courses at Technology.

"In 1921, Pratt himself took the controls of a government plane on the first flight test. His gear worked. Says the decision: 'The airplane was landed and its speed retarded to about 10 miles an hour when a defective cable connection parted.' There was a resumption of tests, one crack-up, and a perfect demonstration a month later that year."

Our correspondent's letter, sending the above, suggests that our headline be: "Hazen Has Almost 15 Cents Left To Buy Postage." Writing from 233 San Gabriel Drive, Rochester, N. Y., we learn that Hazen was chief engineer of the Rochester Bureau of Municipal Research and now heads his own organization. One product is the Advertiser which is fast restoring domestic tranquillity by enabling its proud possessors to eliminate all advertising from broadcasting at the ridiculously low price of \$5.00, installed. (Advt.!)

Hazen sent his letter in duplicate to Saint and your Scribe and the blarney he wrote about us, together with his request to be listed as a member of 1921, caused both of us to answer his letter — a new high for your Secretaries! We haven't yet seen what Ray got in reply, but the answer to ours is a four-page letter plus a two-page notarized document petitioning the Alumni Association to list Hazen in our Class, with which he was longest associated. He tells us also of a very pleasant meeting with Clyde A. Norton who, for the last two years, has been located in Washington as a commissioner of the United States Court of Claims. In publicly extending congratulations and good wishes to Hazen from the gang, we might advise (both of) our readers that our application heads the long list of those ready to help spend the \$1,250,000!

From the March 29 issue of *Steel*, Cleveland, Ohio: "Walter A. Jayme has been appointed general superintendent of the Wood works, Carnegie-Illinois Steel Corporation, McKeesport, Pa. Mr. Jayme previously was manager of the alloy division, metallurgical department. He joined Carnegie-Illinois in 1935, beginning as contact man of the metallurgical department and took the position of manager, alloy division, in 1936." Good luck, Walter.

The March VI-A *News* reports George A. Chutter with the Hevi Duty Electric Company, Milwaukee, in charge of sales around Chicago, including all of Illinois, northern Indiana, southern Michigan, and eastern Iowa. The same source reports the latest about Philip T. Coffin, conductor engineer, who sells aluminum for the Aluminum Company of America

around the corner from us in New York. Pip's latest is a plan to resell the Brooklyn Bridge to the city of New York! That is, Pip wants to replace the structural steel with aluminum alloy parts, thus tripling the carrying capacity of the bridge.

Here we take leave, to be off the air until the next issue of *The Review* in November. So, when you send in your check to Cambridge for Alumni Association dues, please include a note for your Secretaries. Or, with recovery on the way, invest three cents in one of Farley's miniatures and mail us that real letter you've promised yourself to write. A pleasant summer to all! — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, 10 University Avenue, Chatham, N. J.

1922

Practically everything in the file has to do with reunion. A class luncheon was held in New York early in May at which the following attended: Alland, Ditton, Gayley, Grover, Haskell, Horn, Koehler, Kurtz, Linsley, Molinar, Morgan, Mueser, Payne, Rockefeller, Rogers, Rundlett, and Thomson.

If a movement to be instigated by your Secretary at the reunion has been successful, the next notes of the Class will have been composed by a new Secretary. Your present correspondent feels that a change from time to time in this job is beneficial, both from the point of view of the composer of the notes and of those upon whom they are inflicted. At any rate, whoever writes the next notes will have a wealth of material available only once every five years — reunion news. Good luck to him. — C. KING CROFTON, *Secretary*, United Eastern Coal Sales Corporation, 1332 Lincoln-Alliance Bank Building, Rochester, N. Y.

1923

About 40 indicated that they were going to be at the Institute on Alumni Day in June, as these notes were written. I mention this for the benefit of those who weren't there so that they will see what they missed. The time factor makes it necessary to write these notes in advance.

Charles F. Danver is a columnist in the Pittsburgh *Post-Gazette*, his column being entitled, "Pittsburghesque." His column started off recently with a story labeled, "The Engineer and the Pie." I think it is good enough to quote: "If you've ever wondered what interests an engineer and a salesman when they have lunch together, B. M. Jones gives a pretty good idea with this incident which he says happened in the Oliver Building restaurant the other day. A Pittsburgh engineer, a graduate of the M.I.T., and a certain high-pressure salesman were lunching together and got along all right until dessert. Both ordered pie. The engineer thought he'd like pumpkin and the salesman took chocolate chiffon. When the pie arrived the argument began. Loudly (Secretary's note: You'll believe

1923 Continued

it when you find out further along whom this is all about) the engineer protested that the salesman had the larger slab. The salesman disagreed. The argument waxed hot and furious until the engineer yanked out his scale and, while the other patrons looked on with amusement, proceeded to measure each piece. Result: The engineer won the argument; his pie was the smaller. And the measurements were: salesman's pie, 8 12/16 cubic inches; engineer's pie, 8 7/16 cubic inches. And the moral, I suppose, is: Never argue with an engineer about the size of a hunk of pie." As some of you who have stayed with us thus far may have guessed, the engineer was none other than Howard Walker Dexter, Jr., Past President of the M.I.T. Club of Western Pennsylvania. I have it on the authority of the same Jones who passed the information along to Columnist Danver.

The recent efforts of the Federal government to encourage art received editorial commendation in the *Boston American*, which called attention to the Federal Art Gallery on Beacon Street. Singled out for special mention was a painting entitled, "Low Tide — Rockport," by Lester B. Bridaham, X-A.

A report from Charlie Mapes: "Item (1) is a change from New York City to Pittsburgh. Still with Bell system but doing a very different kind of work. (Charlie's letterhead says he's general plant supervisor of the Bell Telephone Company of Pennsylvania.) General plant supervisor has a great deal to do with the physical operation of the plant as against engineering which comprised my previous work. Item (2) is a fine baby daughter born on May 14, weighing seven-and-a-half pounds and named Alexandra Melvin. Everybody doing well, including papa."

The following item was brought to my attention by Howard Russell. It appeared in the *Providence Journal* late in February: "Walter M. Saunders, Jr., recently elected President of the New England Foundrymen's Association, is an analytical and consulting chemist in partnership with his father in Providence. Mr. Saunders was graduated from M.I.T. in 1923 with a master of science degree in chemical engineering and then spent five years working with chemical paints and textiles. He is a member of the American Chemical Society, American Society for Metals, and the British Institute for Metals." — HORATIO L. BOND, Secretary, 195 Elm Street, Braintree, Mass. JAMES A. PENNYPACKER, Assistant Secretary, 96 Monroe Road, Quincy, Mass.

1926

As assiduous readers of this column have observed, we have been conducting a contest of sorts to determine the most traveled member of the Class. This contest has been eminently worth while, if for no other reason than the letter from J. W. Sanborn which it prompted, which we quote in its entirety: "Your remarks in the March number of *The Review* about the travels of the XXVI-ers challenges me to speak up for the honor of

VI-A. I may not be able to beat the record of the miners and geologists but have managed to get into a few distant spots at any rate.

"Starting way back in the dark ages of 1927, I cut my teeth (or maybe got my sea legs working) on a four months' trip to Havana. The next year doesn't count, as it was spent in the New York office of the International Telephone and Telegraph, but the wanderlust was still strong and the fall of 1928 found me on the way to Buenos Aires, where I stayed about a year, helping with the installation of the shortwave radio stations that now connect the Argentine with North America and Europe. Installation and operation of similar stations in Chile took up three more years and, of course, I had to arrive back in New York in the fall of 1932, which you may remember was not one of the best times for finding jobs in the electrical engineering line. So the travel story was interrupted by a spell of idleness (or, better, a much needed vacation?) and a year with the Hygrade in Salem. In the summer of 1934, another chance with the I.T. and T. came along, and I was lucky to be in the New York office in the spring of 1935 when a call came for a man to come out here to Canton [China] to install a 50-kilowatt broadcasting station; so again I was on my way. The equipment was to be manufactured in London, so I went over there first to get acquainted with it and finally arrived here by a devious route which included visits to Paris and Lausanne (both on business, strange as it may seem!) and the trip around from Marseilles via Suez to Shanghai.

"Our plans for the broadcaster, which will be the most powerful in the Far East, were well in hand, the building was nearly finished, and the installation work well started, when there was a political upset, as there so often is in China. This was last summer, and since then we have not been able to make much progress. So my stay here has already been longer than was originally expected. But we have hopes of getting things straightened out so that the work can go ahead soon. Well, do I qualify as a runner-up in the travel contest, or is someone going to come along with a better story?" Whether Mr. Sanborn holds the record or not, we do declare that he deserves a sprig of laurel for writing so persuasively in behalf of his candidacy.

Another of our agents reports that Leo Teplow, formerly with the United States Patent Office, is now a full-fledged patent attorney for Allis-Chalmers, with headquarters at their factory in Wisconsin. — Hump Barry was in town, the last of May, and the Secretary had the pleasure of lunching with him. He is located in New York and is sales representative for several building materials. — Dave Shepard, looking as magnificently tall as ever, fled England during the coronation season and enjoyed a vacation in this country, which fortunately included a short visit to Boston. He is in the London office of the Standard Oil Development Company.

The *Boston Herald* of April 25 carried this interesting news: "Mrs. John W. Cummings of Melrose Highlands announced recently the engagement of her sister, Miss Edith May Wilson of Melrose, to Mr. Albert Lawrence Taylor, son of Mrs. Julia E. Taylor of Melrose Highlands. Miss Wilson is a graduate of Simmons and Mr. Taylor attended the M.I.T."

B. P. Richardson thoughtfully supplied the Secretariat with the following information: "Frank Grueter dropped in recently, returning from a motor trip which he and Mrs. Grueter made to the Coast. — Jim Crawford is in Philadelphia in the engineering department of the [Bell] Telephone Company. He had an operation last winter but is feeling much better now. I understand he sees Bob Conly occasionally. Bob is in the insurance business in New Jersey. — I called Bill MacInnes at the New York office of Stone and Webster and learned that he was on a prolonged trip to Texas and the Coast and was expected to return some time next month. — Saw by the local paper that Nat Gada was among those present at a dinner celebrating the completion of a new lighting system on the Post Road in Greenwich. He was among those representing General Electric."

Returns are slowly drifting in, in response to Eben Haskell's letter on the class endowment fund. The Secretary urges all those who have not had the opportunity to answer so far to do so as promptly as possible. — Thirty or more members of the Class have signed up for Alumni Day, and the first issue of next fall will carry a report of festivities at that time, including the special class meeting. — May the sun shine upon all of you this summer and may the results be benign and refreshing. This column will not appear again until the first issue of the fall — that dated November. — J. RHYNE KILLIAN, JR., General Secretary, Room 11-203, M.I.T., Cambridge, Mass.

1928

Only a last-minute change in his plans at Frankfort on the Main, Germany, saved Hal Dick from what airship experts, quoted by the Associated Press, state would have been an almost certain and horrible death at the *Hindenburg's* holocaust. Hal had been definitely scheduled to make that fateful flight as official observer for the Goodyear-Zeppelin Company of Akron, Ohio. Had he done so he would undoubtedly have been in the aft section of the ship, where practically all perished. Mr. and Mrs. Ernest A. Dick of Lawrence, Mass., spent a night of horrible suspense until they learned that Hal was still safe in Germany. We of the Class are grateful that Hal did not suffer the burning tortures so vividly pictured by news and newsreel photographers.

Congratulations to Ward Bloomer, who, with Mrs. Bloomer, became the parent of a bouncing boy, August 18. Our news is late on this one, but you can't congratulate a fellow until the new arrives. — A. Fribance has been teaching for three years at Westerly, R. I., and he now feels

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convinced that his interests lie in that direction and not in engineering. — In front of me is a surprising announcement which reads: "Colonel and Mrs. Gilbert Albin Youngberg announce the marriage of their daughter, Helen Biddle, to Mr. Charles Edward Richheimer," on Thursday, April 29, at Jacksonville, Fla. Thus tersely and to the point is recorded the end of Charley Richheimer, perennial and popular bachelor of the Class. To Charles and Helen, our felicitations and every good wish. Charley's address is 1604 Lynch Building, Jacksonville, Fla. It looks as though it would be tough going to assemble nine bachelors for a ball game against the benedicts at our 10th reunion next year.

Here's another bachelor funeral: Bob Cook, I, and Miss Dorothy Blumstein were married in New York City last December. To Bob and Dorothy, our congratulations and best wishes. Bob is now working with the Bryant Contracting Company in New York. — To Mr. and Mrs. Mailloux Cohen (Mike to you) goes one of our very best hand-decorated and gold-embossed medals for proud fathers and mothers. Yes, it's Susanne Cohen, at present nine months old. Susanne and her parents are living in Brooklyn.

We quote the following interesting excerpt from a letter written by W. H. Woods (Gulf Production Company, Room 1515, Box 2100, Houston, Texas): "Conditions here are very good and we are well out of the depression. Our family is still growing. We have one girl and three boys now. The last was born on December 7." That brings in another contender for the mythical '28-offspring prize. So far there are several families with four children, none known with five. — Ed Walton last reported he'd switched from stress analyst and project engineer to the sales staff of Curtiss Wright Corporation. Ed said some time ago that he was too busy with airplanes to undergo marriage; we'll have to save that one for Mrs. Edwin Walton. Ed's interests outside Curtiss are golf, skiing, and free-balloon flights with the Buffalo Balloon Club. That last venture sounds interesting, and since Ed is waiting eagerly for our 10th reunion next year, we'll expect to hear more about the balloon business.

When letters come from our mining engineers we're apt to need a world atlas, and such is the case with Harold Blackwood, who is now superintendent of mines for the Mexican Candelaria Company, Contra Estaca, Sinaloa, Mexico. Harold was married May 17, 1933, and has two boys, aged one year and a half, and three years, respectively. Access to Harold's camp is by plane from Mazatlan on the coast or four days by muleback. He says he has traveled most of Mexico and Central America. — From Mexico we jump to Ponce, Puerto Rico, where Walter Tobie is chemist and bacteriologist in the distillery of Sucesion J. Serralles, Central Mercedita, Ponce, P.R. This company is engaged principally in production of denatured alcohol but they

also make rum which has been acquiring the mellow patina of age and is ready this year. Yes, the Puerto Rico Tobies were married in 1932 and have one boy, aged three.

The next note says merely: "E. C. Perkins, 505 Walnut Avenue, Niagara Falls, N. Y. — Du Pont development division and also still single." Equally terse is Sidney Brown's note from 15 Coburn Road, Manchester, Conn.: "Married, June, 1932; one boy, aged two; Rogers Paper Manufacturing Company."

From far-off China comes a note from Jue Hu, VI-A, who, since graduation, has been: (1) designing engineer, Chekiang Electricity Bureau; (2) director of electrical testing laboratory, Chekiang Electricity Bureau; (3) professor in electrical engineering department of Chekiang University; (4) shop manager, machine-gun factory, Shanghai Arsenal; (5) head of electrical engineering department, Chekiang University; (6) technical expert, National Construction Commission; now general manager, Chinese Government Electric Works. Jue Hu was married in 1930; has two boys; and can be reached at 650 Pansunyuen Road, Nantas, Shanghai, China. Our sincere congratulations to you, Jue Hu, on your remarkable success.

Next we hear from Shikao Ikehara, VI, at Osaka Imperial University, Osaka, Japan, who describes himself as the reception committee for Tech men in Japan. (He recently entertained Professors Wiener and Jackson.) Shikao urges classmates to visit Japan, assuring us that the soldiers won't kill us even if they might sometimes shoot generals. — From Japan our magic carpet moves to the Huguet Silk Company, Hornell, N. Y., where Edwin Celette is employed. Edwin was married in 1930 and he has one boy, aged six, and one girl, aged three. — Now we unfold the news from Henry Conroy who is assistant chief engineer in the department of public works, Newfoundland. Henry's address is 50 Bonaventure Avenue, St. John's. He was with International Paper for five years, doing hydro work, but since 1934 he's been working on roads, bridges, public buildings, and so on. Henry, being a Course VI man, says he had little preparation for this, but he adds that so far none of his bridges has collapsed.

Best wishes for an enjoyable summer. — GEORGE I. CHATFIELD, *General Secretary*, 5 Alben Street, Winchester, Mass.

1929

Another Commencement has passed — the eighth since we left the Institute — and reminds us that just about two years hence we will be in Boston or its vicinity, celebrating our 10th anniversary as Alumni. There will be more publicity on this a year from now and during the succeeding months, but fix June, 1939, in your minds now, for at that time we will gather to recount the events of the last 10 years and do honor to Tech.

One of the events of the month and probably the biggest moment in the life of Gordon Williams, I, since we all left

Boston is announced on a small card mailed from Boston: Gordon and Mrs. Williams became the parents of a son, Sidney Shapcott Williams, on May 10. To Gordon and Mrs. Williams we extend our best wishes for a healthy, happy baby who, like his father, will some day be enrolled at our Institute. — We have received an announcement through The Review Office of the birth of a daughter, Eleanor, to Johnny Wilson, XV, and Mrs. Wilson, on March 10, probably in Greenville, S. C., where Johnny has been salesman for a machine company. To Johnny and his wife we extend our best wishes.

Art Jones, VI-A, has recently visited the Course headquarters at Tech after having completed a six months' assignment at Honolulu, where he acted as engineer for Anaconda Wire and Cable Company, installing cable on two new Naval radio stations. — In *Science*, April 9, we are informed of the appointment of John G. Kirkwood, V, as associate professor at the University of Chicago. John received the 1936 award in pure chemistry given by the American Chemical Society and has been assistant professor of chemistry at Cornell. — Through the newsclipping services we learn of the resignation of David Graham, VI, from the board of the J. Walter Thompson Company, advertising agency of London, England, along with other members of that organization, to form a new company, Graham and Gillies, Ltd.

We have a fine letter from George Logan, I, who works in Philadelphia and lives in Jenkintown, Pa. Since 1934 he has been with The Electric Storage Battery Company of Philadelphia, but why should I try to recompose his thoughts? Here's his letter, practically in its entirety: "I just read in the last issue of *The Review* that you recently made a visit to Philadelphia. Gosh! Two reprimands to you for not looking us up and allowing Fran to have the pleasure of meeting you. The next time you come here, you really must plan to stay with us. . . . [The following is a] brief account of my work: Ever since 1934 I have been with The Electric Storage Battery Company of this city (Philadelphia). I have been helping with the development of a rubber separator for storage batteries. Our patent on this process was bought from Dewey and Almy of Boston. At first we used the process as they had developed it, but we had to take it from the laboratory stage to a production one. Originally we poured the rubber on a traveling cloth belt. Then we wanted a ribbed separator, so ejected clay in formation on the cloth and the rubber compound on this. This method was too costly. Next we bought a German method of using a formed tin sheet in place of the cloth. We are now improving this and adapting this to production methods. But we are not the only ones working on a rubber separator: Firestone and The American Hard Rubber Company have repeatedly submitted samples and endeavored to obtain this business from us. . . . Very nearly time for our first wed-

1929 Continued

ding anniversary. Boy, I sure am glad I gave up being a bachelor! . . ." Many thanks for the letter, George. Come again, any time. Let's see if we can't get a few letters like the above from the rest of you. We can guarantee the appreciation of your friends in the Class. — EARL W. GLEN, *General Secretary*, Box 178, Fairlawn, Ohio.

1933

As this month's news rolls in we have a bit from quite a distance: the *Indian Textile Journal* of Bombay. It tells of the urgent need for cotton in Bengal and of the formation of the K. C. Biswas Company by K. C. Biswas of our Class. During his 14 years in this country, Biswas became an expert in this field and much optimism is expressed with regard to his new company. — The latest we hear about Bill Huston is that he is still in England with the Oxford Group, where he has been received very warmly by the English people. — Among the recent changes, we note, in the Boston-Maine Airways is that of the advancement of Bob Swain from dispatcher at Manchester, N. H., to the dispatcher's post at Bangor, which sounds nice for Bob.

Nat Goodman wrote me that he had transferred his affiliation from Sears, Roebuck and Company in Philadelphia to S. Liebovitz and Sons, Inc., at Myerstown, Pa. Here's part of what he has to say: "The company is the largest manufacturer of men's shirts, with many small plants throughout Pennsylvania. My capacity is that of an industrial engineer and very shortly shall be in the midst of plant-layout problems. This work is to be done at the Gallitzen, Pa., plant of the company, where I expect to be located for the next few months.

"I heard from that reluctant correspondent and thesis partner, Gordon Pearson, who is still at the Toronto, Canada, plant of Colgate-Palmolive Peet. He writes that the length of his stay is dependent mostly on the Dominion government. When in Boston in March, talked with Mal Mayer, who is back in Boston and now is working in Framingham. He is still unmarried, but not so is Otis Shurtleff, whom I met in New York several weeks ago. Otis is in the investment counsel business and reports pleasing progress. Gee, George, I forgot to mention that Dick Robinson is the proud papa of an offspring, sex not accurately known to me. Jack Farmer, my informer, is still located with Bethlehem Shipbuilding at the Fore River Shipyard." Thanks, Nat, and let's hear some more.

There's my story for this time. If any of you visit New York this summer, give me a call. — GEORGE O. HENNING, JR., *General Secretary*, 330 Belmont Avenue, Brooklyn, N. Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-107, M.I.T., Cambridge, Mass.

1934

We are now officially three years graduated. As time has marched on, I sincerely hope that the progress of each of us has kept step, and that we are reaching the

stage where we can say that we are at last retiring some of the investment in our respective educations. Our four years at Technology represent at least eight to ten thousand dollars in loss of income and additional expense during that period; however, from an investment standpoint, it is excellent when one stops to multiply the increment of earnings which he obtains each year by virtue of this education, by the number of years we have yet to work.

Speaking of success, I was successful this month in dragging a letter forth from Esslinger, the "ad" man. Art feels that his being called "a low form of animal life" by Geittmann, XV, through this column is ample consideration to justify a libel suit against Geittmann, myself, M.I.T., and the Federal government. My only safe exit is to say publicly that the injured Esslinger considers that said Geittmann is a low form of vegetable life. (Maybe that's a yeast cake or something.) To get away from the prattle of these, our children, we shall turn to the news of the month as it came in from day to day in the letters which you fellows sent to me.

Robert C. Becker, our Assistant Secretary, has sent me a very interesting letter from Portoviejo, Ecuador. Bob, as we said before, is on a new job, working as a mine shift boss with 82 men under him. They are producing about 150 tons of ore a day and to oversee these men and maintain adequate quality and a high standard of safety gives Bob plenty to keep him busy. Recreational facilities are not lacking, however, among which are baseball, golf, tennis, and basketball. A swimming pool, a library of 1,000 volumes, and game rooms are also provided. The company is to be congratulated for the extent to which they furnish sanitary housing and living conditions for all employees. Their standards exceed even those established by the Federal government in the Canal Zone. In a very inconspicuous paragraph near the end of his letter, Bob announced some real news — his engagement to Miss Grace Purdie, daughter of the superintendent of power and construction for the mine in Bolivia where Bob was previously located.

Ralph Geil, another globe-trotting miner, is a long way from home at the present time, his letter having come from Ampang, Selangor, Federated Malay States. Ralph is with the Yukon Gold Company, handling placer tin operations. Besides his mining education, he is rapidly becoming a naval architect through handling the design of a new dredge for underwater work. My old friend, Danny Cupid, is operating a Malay branch apparently, because I find that Ralph's engagement to Miss Rosalie Sullivan has been announced. Miss Sullivan is a graduate of Boston University where she specialized in therapeutics and at this time is head of the Therapeutic Clinic at Jersey City Medical Center. The wedding should take place about next March, we believe. To illustrate the old saying that this is a small world after all, Ralph writes that he met Charlie Hill,

completely by accident, in a small hotel in Kuala Lumpur. Charlie is busily engaged in air conditioning the East Indian countries for United Engineers, Ltd., who are handling Carrier air conditioning.

In fairness to Artie Esslinger, I should say that he spent some time in giving me interesting news in addition to devoting space to insult Ed Geittmann adequately. Art is still with McCann-Erickson, one of the largest advertising agencies, developing his bright ideas for the Talon Slide Fastener account. This is a transfer for Art from the research department. — He continues by saying that Art Hungerford is in New York doing some excellent work for RCA on television to develop its commercial applications. — Bob Roulston is busily engaged in New York in air-conditioning work for the B. F. Sturtevant Company. Both the fellows are in hopes that most of the Broadway night clubs will install air conditioning. I suppose this will justify their nightly attendance. — Al Loring, says Art, is at the Manville, N. J., plant of the Johns-Manville Corporation. Rock-wool insulation is his principal source of worry at the present time. It is interesting to me to note the number of fellows who are getting into new industries — industries which are growing and which offer to the public the results of the application of recent scientific research.

Probably we all can look back to some good deed the Technology Christian Association did for us as undergraduates. If any of you fellows has been missed by the recent T.C.A. drive for one reason or another, I hope you will take it upon yourself to send in a contribution, if only a dollar or two, to help carry on the excellent work which Wally Ross is doing to ease the path for the freshmen and for the other struggling undergraduates.

Upon entering my apartment the other night I was very pleasantly surprised to see Rex Murdoch standing there fumbling at the bells. Rex is, at the present time, handling industrial lubrication sales for the Texas Company in the Southern New England district. — Ray Jewett and his wife spent a very enjoyable evening with my much better half and myself in doing up Gundlach's, a new German *hofbrau*. The first of its kind in Boston, it has been going over big and the younger set is flocking there in droves. I can highly recommend it to you fellows visiting Boston. Ray is now with the same company as George Patch (their wives are sisters, by the way), the Linde Air Products Company, in the research division.

Marriage announcements are coming thick and fast. Close upon their heels, I am receiving an increasing number of second generation announcements, potential members of the Class of '59. Among these is John William Hartz, who entered this world on April 6 as the son of Mr. and Mrs. Frank M. Hartz, VI, now residing in Detroit. On May 12 Edward Sumner Rand, XIII, was presented with a daughter, Priscilla Hathaway Rand, who will probably marry a Tech man about 1960. I am assuming, of course, that she will be a Wellesley girl.

On Wednesday, April 7, at Hinsdale, Ill., Mr. and Mrs. George Lacy Wire announced the marriage of their daughter, Louise, to William Randolph Churchill, XIV. The happy bride and bridegroom will be at home to all you fellows in the neighborhood of New York City at their new residence, 83-09 35th Avenue, Jackson Heights, Long Island. The bride is a graduate of Wellesley College and the Walnut Hill School in Natick, Mass. — Of great interest to you fellows who used to haunt the boathouse at seven o'clock in the morning is the marriage on April 10 at Port Chester, N. Y., of Johnny Moomaw, X, and Miss Lucille Simmen. Miss Simmen was graduated from the New York School of Fine and Applied Arts and from the Paris and Italian Research Schools.

Among the engagements we find the announcement that Hugh Healey is to be married to Miss Emily A. Long, daughter of Mr. and Mrs. Thomas A. Long of Massachusetts Avenue, Cambridge. From the Boston *Herald* we learn that the Rev. and Mrs. Otto S. Raspe of Cambridge announce the engagement of their daughter, Amalia, to Charles F. Barrett, Jr., of Springfield, Mass.

Miss Raspe is a member of the class of 1937 at the Sargent School of Boston University.

No formal observance of Alumni Day was planned by our Class for this year. Next year, I hope that we can stage an informal get-together for those fellows who can easily attend and the year following we hope the sky will be the limit in properly observing our fifth year away from the awe-inspiring edifice at the corner of Massachusetts Avenue and Charles River Road. — WILLIAM G. BALL, JR., *General Secretary*, 18 Ware Street, Cambridge, Mass. ROBERT C. BECKER, *Assistant Secretary*, South American Development Company, Apartado 655, Guayaquil, Ecuador, S. A.

1935

News of marriages continues to roll in: Elizabeth Belisle and Oscar Foptaine were married on April 21 in Fall River. — Margaret Robinson and George Bays were married on June 1 in New Ipswich. George took his master's degree in 1935. — Dorothy Neery and Frank Muldowney will be married in the near future. — So, also, will Edith Colt and Horace Peters. Edith studied architecture at Tech with our Class. — The last engagement which I have to announce this time is that of Virginia Hill and Dick Hughes. Best wishes to you boys and girls.

Our only letter this month is from Ed Taubman, who has had some rather interesting experiences. Here is his story: "I believe I wrote last spring some time, so I will sorta begin back B.R.W.R.B. A.B.O.D.F. (before Roosevelt was re-elected by a bunch of damn fools). I'm a staunch Democrat, you see. Anyway I was working for my dad in our Annapolis store at that time and a month later in May was shifted to Newport News, Va. Our auto accessory store there had just had gas pumps installed on the sidewalk

and we were going to town, ballyhooing and disturbing that gas market. Finally business got so good we had to expand either to keep it or drop the business because of poor facilities in handling it. So we took over the building next door on the corner, tore down the walls, and built a drive-in station. This gave me a good deal of valuable experience as I had to deal with landlords, contractors, arrange the entire deal, keep on doing business, and arrange for a grand reopening and sale. The grand reopening was a honey. May I do without them in the future! First, I got the bright idea of staging an amateur program in our new station, giving prizes, and so on. This was fine up to the dawn of the opening day. First the state child-labor inspector barges in and informs me half the kids listed in the contest had previously entered another amateur contest to be put on the next day, and the state law forbade a child participating in two in one week. Well, the program was due to go on the air also, and this necessitated a last-minute change of the entire program. Next, the fond parents of the kids forbidden to enter began raising hell with us because of the state law.

"Next, we had originally decided to use an applause machine to judge the winners of the contest, but the radio station manager decides at the last moment that street noises would make this unfair (the program was daylight, open air) and that, therefore, we should have judges, namely, he, me, and a theater manager. Jumping to the conclusion I would have to sit on a stage, I wasted a valuable half hour bathing and shaving, and then found out we were to judge the contest over an auto radio, unseen by anyone. The program started and, right in the middle, the tank truck that delivers our gas rolled up with 3,000 gallons of gas. I got him out of the way temporarily, but was so excited that when making out the checks to the winners I forgot to stamp them correctly and was later accused of trying to 'pull a fast one.' About five minutes after the damn thing ended, all the fond mammas of the brats that did not get prizes began calling up and telling me what a lousy judge I was, how punk our gas was, and how they were going to tell the town not to buy another gallon of gas from us. However, we are still doing business. Finally our gas truck began to unload. The place had just been finished and one of the workmen had left the cap in the vent pipe of one of the tanks and the gas backed up, with the result that about 200 gallons went pouring over the street. Out comes the fire department, and they spent a half hour playing several hoses of water over everything. We had a bigger crowd for that than for the amateur program.

"The day finally ended but it came near ending me also. We enjoyed a swell fall business, but since Christmas, because of the unusually mild winter, we have been taking a kick in the pants. Right now we are remodeling the entire store and I am having my hands full with a temperamental carpenter whom I have to

keep 'likkered up' in order to get more work out of him. I have not seen much of Tech men. Paul Lappe and Jim Kusnitz [hope I deciphered the name right] both '34 got taken over by a couple of skirts last year and I attended the sad ceremonies. Bumped into Leo Epstein in Times Square during Christmas holidays — enough to say 'hello' and 'good-by.' During one of my infrequent visits home in February, I attended a local (Baltimore) M.I.T. dinner and met several 1935 fellows. Names are on the tip of my tongue, but since it is 2.00 A.M. now, my tongue will not function properly. Outside of that I don't think I would be recognized as a college grad. My dad informs me that I am just a good grease monkey. At any rate the firm is now Taubman and Sons, so maybe I am due for a promotion. According to my sheepskin I was graduated an engineer — but I'll be hanged if I can remember any of the courses I've taken up, except how to go to sleep anywhere, anytime. I'll bid you and The Review au revoir for another year. By that time I hope to have my own secretary so that I can just dictate for a half hour and let her do the actual work. If just a few of dad's and my plans pan out, I'll have three secretaries: two to write letters, and one to fill out income tax returns. That's the only tax I don't mind paying (much)." Many thanks for the letter, Ed.

The other day I was walking from one class to another and ran across Gerry Golden. He was driving a new Ford V-8 (the company's) and hunting business for the Service Caster and Truck Company. We talked as long as possible before I had to tear away to class. Gerry told me that the company was organized a short time ago as a subsidiary of a larger company, but that it has since become a separate unit. The company manufactures all kinds of material-handling equipment for industrial companies. I don't remember all the types of equipment they produce, but it included push trucks, hydraulic hoists, and similar equipment. Gerry is the sales engineer and says that he enjoys the work immensely. He related a bit of information about some of the boys. Kingfish King is working for Graton and Knight in Worcester on power transmission, mostly belting. Beckwith and Larry Stone are with Market Forge Company in Everett, Mass. The company is a competitor of Gerry's in the material-handling equipment field and in addition makes numerous other steel products. Walter Daley is with the Boston Edison Electric Illuminating Company, working at sales engineering. Jim Glenn was with the Color Corporation, but is now working in Shelton, Conn. He spends a part of his time at Tech working with Professor Hardy '18 on color analysis. Hall Everett is with the Foxboro Company in their New York sales office. Jack Colby is in Boston working on thermostat controls for the Johnson Service Company.

That's all the news for this time. If some of the information is a bit inaccurate, chalk it up to that fact that I'm

1935 Continued

writing while on a visit to Chicago and I do not have my files here. Be with you again next fall with news of Alumni Day. Until then, how about limbering up the dusty old typewriter and giving me the low-down on your work and experiences? — ROBERT J. GRANBERG, *General Secretary*, Hamilton D-32, Soldiers Field, Boston, Mass. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road North, Chestnut Hill, Mass.

1936

It seems appropriate that we should start this July column, coming as it does immediately following June, with some wedding announcements. In chronological order, we come first to the wedding of Dick Mandelkorn on June 3. The bride was Miss Katherine Dugan of Cambridge. Following less than a week later, on June 8, Walt Squires took the big step with Miss Betty Brown. The newlyweds are going to start housekeeping in Baton Rouge, La., where Walt has a job with the Standard Oil Company. Finally, our class baby, none other than Everett Henry Cargen, Jr., was married to Miss Barbara Lumsden of Belmont on June 19. Incidentally, Al Horton was the best man for the occasion and was almost as proud as the bridegroom. Our congratulations to these three couples. Another wedding which has not yet been announced in these columns occurred some time ago — April 11. This was the marriage of Harry T. Easton to Miss Mary C. Dwyer of Winthrop, Mass. Harry is an engineer for the Postum Company in Battle Creek, Mich.

With all these marriages, the number of engagements has decreased; there is only one this month. That is the engagement of Francis Peterson to Miss Winnifred Clark of Newton. Plans are being made for a wedding early in the fall. Pete is now on the engineering staff of the Texas Oil Company of Beacon, N. Y.

Before the Secretary received the following letter from our President, Jack Austin, we were beginning to doubt that there still existed such a person, until we received a letter from Gyp the Dip of Chicago. He inclosed a clipping from the *Chicago Daily News* which read: "I tell my husband I believe he'd rather be late to work than miss his second cup of Chase and Sanborn coffee in the morning. He laughs at that, but really he enjoys its rich, fine flavor so much, I know he wouldn't miss it for anything." — Mrs. John C. Austin, Chicago, Ill." And the picture shows Mrs. Austin pouring coffee for Mr. Austin. We were misled by the Chicago, Ill., part, until Johnny's letter came from New York. We know, now, that he is still with First Boston. He says: "... I haven't run into anybody — not since Christmas when we saw Peggy and Fletch, and had a little reunion of our own at the Manhattan room. Horace Ford, Jr., '31, is down at First Boston now, in the trading room. I'm working on the telephone sales desk — calling up some small out-of-town banks, giving them market quotations, pointers on new issues, and so on.

"The sailing bug still has me in its teeth, so I've undertaken to build a 15-foot, six-inch Snipe. There are a lot of them around Oyster Bay, Glen Cove, and Sea Cliff, so that racing possibilities are present in abundance — if, as, and when I get it finished. I laid the keel last Saturday, and built the frames and center-board trunk, so I have plenty to keep me busy still. My Boston correspondent has sent me clippings from time to time about the success of our Tech dinghies, which I've followed closely. — In looking into some of New York's out-of-the-way places, we've found a swell place to eat in Chinatown, with real McCoy as far as Chinese cooking goes, such delicacies as squab, Moo Goo Gai Pen. No bird's-nest soup yet, though — but I'm a confirmed addict. It will be only a matter of months now before I take to dope. ... Well, give my regards to any of the people who would be interested in having them. When any of youse guys get down to New York, be sure to give me or us a ring."

Course II. Jim Patterson submits the following as his offering for the month: "... Al Musschoot sent in a bit of personal history around the middle of March: 'After graduation, I came out to Columbus, Ohio, and started in with the Jeffery Manufacturing Company and have been here ever since. The work has been most interesting and I have acquired some valuable experiences. ... In spite of the distance, I have been back to Tech six times (sounds like a romance, Al). The last time, I saw Fred Prah and he seems to be doing very well. Is Laddy in Cleveland now? ... (The last I heard of him was that he worked in Cincinnati. I haven't had any word from him lately and suspect that he floated South on a log during the floods. Or it may be that he is devoting all his literary ability to correspondence with a former Simmons girl. That ought to get a rise from him.) I have discovered that Columbus has a Technology club whose greatest function seems to be a monthly luncheon. ...'

"Jim Griffin, who is with Bill Hope in Niagara Falls, both of them working for The Moore Research and Service Company, Inc., wrote that he was well pleased with his job and that it was just the type that suited him best. — I regret that I cannot send you the latest masterpiece that came from Cesar Calderon, but here is a brief excerpt: 'As far as my work is concerned, I have already completed my training at the erection divisions and for the last month have been at the test floor. ... I'm supposed to go to Indianapolis where Fairbanks Morse has a subsidiary, The Home Appliance Company, and take a training course in air conditioning.'

"Fred Prah is located in Beverly, Mass., and everything seems red and rosy with him. But let him tell you about it, himself: 'I am working at the United Shoe — started in August — finished my training course a few weeks ago and now I'm getting a taste of the drawing board for a few months. I like the work and it is very interesting. I'm keeping up with the dramatics here — belong to a few ama-

teur groups in and around Beverly. Keeps me busy nights. Seems as though Pete, Paul, and Leo beat us to this marriage business, but I'm getting rather fed up on driving to New York every few weeks — will probably follow their example before long. I'm pushing a new Ford around now, and like it a lot. Heard from Chet some time last fall. ... He's all set at Allis-Chalmers; Sarvis is there, too.' It is good to hear the news about Pete. I heard rumors of it last fall but nothing further.

"On April 29 I attended, for the first time, a meeting of Tech Alumni of Buffalo. It would have been a disappointment to have missed it because Dr. Compton was our guest speaker. ... — For the last couple of months or so I have been kept busy at our East Buffalo oxygen plant, where I'm working on an experimental set-up in connection with a very interesting problem. I am enjoying my work a great deal.

"Every week-end that I can arrange it, I make the trip of slightly over 200 miles to Utica. Since the snow has left the roads, I have been doing it on an average of every two weeks. When I stay around Buffalo I generally have an opportunity to get out into the country with some of the other lab men. Two weeks ago (April 25) Shorty Hubbard, two others, and I went about 40 miles south of here and spent the day climbing in and about Zoar Valley, where the sides of the gorge are of shale and rise perpendicularly in some places. It was my first experience with the toe and fingernail method of locomotion. ..."

Courses III and XII. From The Smoky City, Stan Johnson has managed to write another installment of the activities of this group: "... We finally have some really authoritative matter about Re Hornor, who, you will remember, decided to seek his fortune on foreign soil. 'By this time,' Re says, 'I have had firmly impressed on my mind just how ... little I know about practical geology. You may remember that geology was my Course. I am supposed to be assistant geologist here. Why am I in Bolivia? ... I suppose the real answer is that I am one of the great army of fools that are seeking "experience" and at the same time trying to make a living. ... Nothing grows in Potosí, except boredom. But I don't want you to be misled: Life here could be worse. At least I am developing a very healthy respect for life in the States and will appreciate it much more when I take it up again.'

"Bruce Old is the kind of fellow who just won't write much about himself. He finally admitted, however, that he is one of those fortunate people who were given fellowships at the Institute. He is working on his doctor's degree now. — John Petrouskas, the clam-chowder man, verified the rumor that his work is with Bethlehem at Sparrows Point, Md. His present position is in the general metallurgical department as plate-mill inspector. — Lew Gilbert, former boxing ace at Tech, has a very interesting story to tell, so we'll let him tell it in his own

1936 Continued

way: 'After leaving Camp Devens, I decided it was time to get serious, so after writing a few letters I hopped a train for Chicago. Among the many acquaintances on the trip, I met a fellow who worked for Universal Oil Products at East Chicago and who lived in Hammond. I accepted his invitation to stay at his place for a while until I connected. You may guess from his hospitality that he was an M.I.T. man ('34). The first day out I got a job with Carnegie at the South works. The second day I got a job at Inland Steel at Indiana Harbor. The third day I received a telegram from home saying that Wickwire-Spencer at Worcester were looking for me. I went back home for a week and after talking things over decided to stay with Inland. Johnny Pappas now has that job with Wickwire.

"After all this excitement, I settled down in Hammond [Ind.]. About a week later an unlooked-for experience occurred: Walking down the main street my roommate was bumped on the shoulder by a big bruiser. Before you could say Massachusetts Institute of Technology, they were at it. The big brute was getting the worst of it, so his buddy sailed in also. There was nothing left for me to do but to join the fun. In a few minutes we left them in sitting-down positions while we took to foot before the cops came. Boy, was I glad I knew how to handle my hands. That was the first and last time we were molested. I worked out with the Inland Boxing Team for a while, but a combination of outside activities, shift work, and lack of competition made me lose interest.

"I started work as a combination observer and inspector at the 40-inch blooming mill. After a short time I was transferred to the open-hearth department, which was mighty good experience. About the middle of October a new 46-inch blooming mill was opened. I was sent up there and work there now in conjunction with the continuous hot-strip mill. So far, I've seen service in the rail mill, plate mill, and bar mill, besides the other departments I've mentioned, which for one year I think is pretty good. Lew reports that 'socially, life is pretty much fun.' He plays a lot of golf and tennis and keeps in touch with quite a few blondes and brunettes, although that certain one hasn't come into his life as yet.

"Bob King reports that he is leading a very interesting life in Climax, Colo. In fact, his life has been so crammed full of work that he offers this as a good excuse for not writing sooner. Bob started with the Climax Molybdenum Company as a car checker on September 27 and remained at that job until the middle of November, when he was advanced to rodman. He was rodding for Ed Clark, Jr., until Ed left for Butte to take a job with Anaconda. Bob and Ed had plenty of good times together. Skiing was their favorite pastime. Since Bob is a Norwegian, he claims that skiing is in his blood. He says the slopes around Climax will have enough snow for skiing until July. Recently Bob has been doing a little surveying and some drafting work

concerning ore reserves. This is the closest he has come to any geological work. 'It seems queer,' says Bob, 'that after taking all the organic options in geology and omitting all the mining and economic ones that I should land in a metal mine right off the bat.' Although Bob is very satisfied with his work, he would like something with more of a geological flavor. Social life at Climax is virtually at a standstill because all the nice girls, Bob claims, are married or in hiding. This applies to Leadville too. Bob says that he may alter that statement as soon as he gets Old Faithful out of storage. At present his spare time is taken up with choir practice and piano moving at the Presbyterian church in Leadville. He has not neglected his hobby of nature study, because Bob has read every book on plants and birds at the Leadville library. He just bought a lot of new 'doo-dads' for his five-inch by seven-inch tripod camera and expects to go bird and plant hunting soon. So long, Bob; here's hoping Old Faithful will enliven the social life of Climax and Leadville. . . .

"As for me, life isn't nearly so dull as it was this winter: There have been many dances, theater parties, tennis and golf matches. Speaking of golf, I played for the second time in my life a couple of Sundays ago. Lea Spring and Jack Ballard were in the party. Everyone was off form, so that my showing was comparatively good. . . . The alumni club of western Pennsylvania just got me for \$1.00 in dues; I guess that makes me an official member."

Course VI-A. This group of electricals is just getting out into the world, but from the following account by Mart Gilman, we are led to believe that they have already begun to leave their marks:

"... Three of the boys are headed for the city of Brotherly Love, but they will probably be looking for the sisters. Bill Saylor is going with General Electric and Ed Halfmann and Ray Woodrow are joining the great Philadelphia Electric Company with the hopes that they may be able to light things up down there. G.E. in Pittsfield and Schenectady is claiming several of the other boys, too. Among these are Lawrence Peterson, Boris Maximoff, and Norm Willcox. Charley Rife, who has been working at Schenectady for the past year, was down at the Dorms this spring and had a chat with some of the boys. He thinks he may come back to the Institute this summer for further enlightenment but that will depend on many things, says Charley.

"The Bell system is also getting its share of the finest in engineers (VI-A men, I mean). Frank Phillips is going with the Bell of New Jersey and Al Whitcomb is going to run things up here for the New England Tel and Tel. Long Lines in New York, and points south, north, east, and west, is taking Lu Robinett and Walt MacAdam. Well, good luck boys.

"And of course, your correspondent has been working steadily these two months at General Radio doing one thing and another. The first month or so it was

mostly learning the ropes, and wires. There certainly is a fine bunch of fellows to work with in the engineering department and royal treatment is the order of the day. I am now taking a turn in the calibrating laboratory where some of the testing is also done. After that I will spend some time in the other departments before taking up any definite assignments. I hope the rest of the Class has as good luck with their positions! . . ."

Course VI-C. The only news from Jack Cook was written just before the recent examination period. He complained of five examinations and no letters. He indicated very briefly that he was to start work on June 21 as a research assistant in the Department of Electrical Engineering at Technology, his appointment being for 12 months.

Course XIV. This letter came recently from Jack Hamilton: "... Since my last letter, I've heard from Dick Hitchcock and Harold Brown, both of whom want to know the why of the recent lack of news in the monthly column. Apparently Wade and Kanner do not read The Review or perhaps they just don't want to see their names in print. At any rate, they maintain their frigid silence, 100%. We have a slight correction in Hitchcock's address: He and the better half of the family have moved to 110 West Embargo Street (from 104), Rome [N. Y.], and are living in what Dick describes as 'a swell three-room apartment, air conditioned, oil heat, shower, electric refrigerator, gas stove, and all our own furniture 'n' stuff.' What he means by 'stuff,' Dick doesn't say, but he sounds enthusiastic. He plans to get home over Memorial Day week-end, for the first time since his marriage in February and meantime is being kept quite busy (up to 12 hours a day) by Revere.

"Brownie continues to do 'hundreds of routine analyses on steel, iron, brass, copper, zinc, slags, and fuel oils, with an occasional chance to develop some new method of analysis or new way of treating the routine work' for American Steel and Wire, in reparation for which they have given him several raises — lucky fellow. He spends some time at the Institute and sends me all the dirt from there, but it's a long time between letters. — On April 23 the Niagara Falls Alumni had a luncheon meeting with Dr. Compton as guest of honor. I think all the '36 men in town attended: Bill Hope, IX-B, Jim Griffin, II, Dick Robinson and I from XIV. Dr. Compton told us some of the details of the new building program and gave an interesting account of some of the how's and why's of the reorganization of several of the Institute's departments.

"Robbie and I are still engaged in our more-or-less secret research, and both can report a little progress. Robbie looked very prosperous when I saw him at the above-mentioned luncheon, probably because he is not trying to run a car and, at the same time, pay for it. But it's worth it. Home twice, Detroit once, and Cleveland to take in a couple of operas by the Metropolitan company since my last report. . . ."

1936 Continued

Course XVI. Dorian Shainin, down at the Hamilton Standard Propeller Company in East Hartford, felt in a talkative mood one evening and the following letter is the result: "Boy, oh boy, practically two columns for Course XVI this past month in The Review. I thought that perhaps by breaking my epistolary silence of 11 months some of the other boys would also feel that, at least once every 11 months (just so nobody could say they wrote only once a year) as a duty to course and lift coefficient, a letter of some length should be duly dispatched for the perusal of the other members of our flighty group. And for those who don't think we're flighty, just consider Chappier, Dashefsky, and Runkel — two aircraft companies apiece, and all in less than 11 months. Then there are our black sheep — Francis, Trimble, and Sharpe — who flew right out of aviation to get out from under a barrage of negative and positive moment coefficients. If they stay out of the game much longer, they'll forget which are negative, which are positive, and why — or have they forgotten already? Tsk, tsk, and after all that Professors Ober ['16] and Koppen ['24] said!

"Yep, ours is the Course all right! We even have those who take our flighty nature so seriously that they've forgotten Professor Newell's ['19] admonition to stay out of 'em. Spaulding and Pearson actually doing their engineering aloft now and then; Runkel, patronizing the air lines week-ends; Breathitt, breathing balmy Texas altitude air in that flat country for the Army Air Corps (how's the wife, Jimmy, and have you still got the Chevy?); and Endweiss, summering in Florida (how is it up in the Florida air in a Navy ship, Charlie, simmering? — or do those affairs make too much noise?). Write me a letter and I'll try to see someone in Hamilton Standard who might be able to see someone who might think about cutting down tip speeds for the Navy. In fact, if anyone should like to dig back at me, my address is 36 Judson Avenue, East Hartford, Conn. I wonder how many of the gang read this column?

"Where's Charlie Shubart? . . . From somewhere or other I heard a rumor that he was with an air line, somewhere or other. That rumor is probably just as far off as propulsive efficiency usually is, or as was the rumor about Web Francis' housewarming, which wasn't his house after all, but his wife's parents' house (hmm, two successive possessives; strange what you come across when you write). Look, gang, just to keep this column filled (old excuse) what do you say we maintain a statistics' section? I'll start it this month and then anyone who wants to contest any figures or descriptions attach your claims to a three-cent stamp addressed to Bus Schliemann, 47 Chapel Street, East Hartford, Conn., or to Tony Hittl, the General Secretary. If any of you don't know Tony, you'll make a pleasant acquaintance by writing to him. . . . Statistics: Bill Benson — did somebody say you were at Stanford? Jimmy Breathitt — up in the air, Army Air Corps, some-

where in Texas. Jack Chapper — Curtiss man, Sikorsky Aircraft, Bridgeport, Conn. Cookie — very poor fellow (still at the Institute, and might stay for some time). Dashy — Seversky man, Sikorsky Aircraft, Bridgeport, Conn. Drew — poor fellow (still at the Institute). Charlie Endweiss — up in the air, Naval Air Station, Pensacola, Fla. Fred Flint — very poor fellow (still at the Institute and might stay for some time). Web Francis — what's a Paragon Revolute? Paragon Revolute Corporation, Rochester, N. Y. Dave Gildea — poor fellow (still at the Institute). Ham, Pappa Jack — Chance Vought Aircraft. For him home, sweet home is Centennial Apartments, Manchester, Conn. Joe King — a *true* Curtiss man, Curtiss Aeroplane and Motor Company, Buffalo, N. Y. Dick Koepler — remember the time we dropped the Al-faro, Dick? Consolidated Aircraft Corporation, San Diego, Calif. Lombardi — metric maniac for Martin, Glenn L. Martin. He sleeps at 72 Northship Road, Dundalk, Md. Fred Locke — the bearded demon of the next European war, Stevens Institute of Technology. Bob Lutz — retractable wing floats, eh? Consolidated Aircraft Corporation, San Diego, Calif. Harold Miller — a Russian clipper man, Glenn L. Martin (spends some evenings at 2730 Louise Avenue, Baltimore, Md.). Dick Murrow — poor fellow (still at the Institute, and married). Johnny Myers — poor fellow (still at the Institute). General Ostby — back home in the old country? Dan Pearson — they tell me you're liable to end up in Guam, Pan American Airways, somewhere in Florida? George Ray — can't decide on the DC-4, Douglas Aircraft Company, Santa Monica, Calif. Riley — did someone say you were with the Naval Air Service? Runk — Curtiss man, Sikorsky Aircraft, Bridgeport, Conn. Sangster — at the Institute or in Scotland? Bus — drawn into the Institute's tunnels again and I mean wind, Chance Vought Aircraft, East Hartford, Conn. Shainin — working on the constantly pitched propeller, Hamilton Standard Propellers, East Hartford, Conn. Larry Sharpe — x-ray black sheep, General Electric, Lynn or Schenectady, Larry? Charlie Shubart — come on, Charlie, we give up, where are you? Yank Spaulding — they tell me you're liable to end up on Midway Island, Pan American Airways, somewhere in Florida? Trim — will never gather moss between bearing races, SKF, Philadelphia, Pa. Marc Warmuth — working on airplane with tin-can effect, Fleetwings, Inc., Bristol, Pa.

"How good's my memory? Have I forgotten some one? More statistics: members, 32; black sheep, 3; married men, 5 (if the General's married, 6); up in the air now and then if not oftener, 6; questionable affiliation, 5; children, 1; on the Pacific Coast, 3; number of men who are the only '36 Course XVI men employed by their companies (aeronautical companies only), 4; number of aviation companies hiring 2 '36, XVI, men, 4; number of aviation companies hiring 3 '36, XVI, men, 1. Conclusion: The only

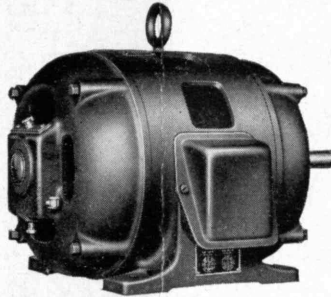
thing big about Course XVI men is their number. Any additions to the pertinent statistics department are to be made at your own risk. Any of you fellows who want to go around gathering course statistics see me. I'll take you down to the United Aircraft Club here. . . .

"Part of the rest of my life is being spent enjoying my work. I was fortunate enough to be assigned to rearrange an engineering data book for licensees on the whys and hows of propeller design, selection, and manufacture. This work, in addition to writing letters informing the company's licensees of all design changes, is giving me an all-around background of the complex business of the manufacture of controllable and constant-speed propellers. Then the performance calculations that often come to me for slipstick exercise keep me on the go in the interesting field of aerodynamics of the airplane. Some more of my life goes to two evenings a week with ten fellows from the plant who have asked me to help them along in their efforts to gain some technical dope on aeronautics in general. They rigged up a blackboard for me and I've actually put two of them to sleep throwing drag coefficients and the like around. Shades of 10-250! And for the rest of my life I'm an amateur, very amateur ornithologist. That means week-ends are spent wandering through Connecticut woods, stalking birds, recording the species seen, and studying their habits. I find it restful exercise and an interesting hobby. See what beer and an Institute education do to one.

"April 15 I went down to Waterbury for a combined dinner meeting of the Hartford and New Haven Technology clubs. Of our gang I saw Runkel, Chappier, and Dashefsky there. Not so very long ago Harold Miller dropped in at the plant to see me on his way back to Baltimore from Boston. A little longer ago Johnny Myers stopped by to sit by my desk and ask questions about the depreciation of propellers — thesis trouble. A still longer ago Dave Gildea visited me, and just the other day I ran into Professor Ober '16 at the plant. Then, thinking way back to last summer, the Course XVI sophomores were here for their summer school week at East Hartford, and, of course, Professor Markham '18 was with them at times. . . ."

The Class has now rounded out one year away from the Institute. Although many of us were on hand for Alumni Day on June 7, we missed those who could not be there, and we hope to see them soon. And that suggests the reminder that Al Horton has taken over the duties of assistant secretary of the Class, these duties consisting chiefly of greeting fellow classmates who happen to be in Cambridge. So whenever any of you are in town, stop in at the President's Office and Al will be glad to sit and chat about the good old days when entrance 69 wasn't a new building! — ANTON E. HITTLE, *General Secretary*, 23 Sewall Street, Melrose, Mass. ALLEN W. HORTON, JR., *Assistant Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

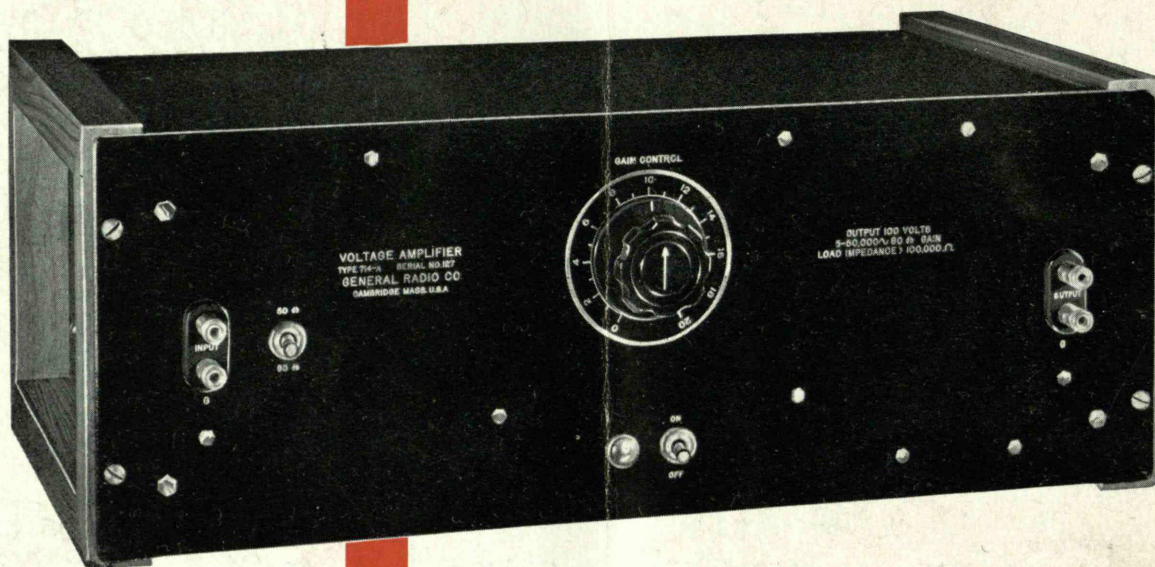
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